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ADVANCED AIRCRAFT ELECTRICAL SYSTEM (AAES)

Definition and Prototype Design for F-14 Aircraft (GPMS)

Grumman Aerospace Corporation
Bethpage, New York

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report covering the amendment P00002 of contract N-62269-75-C-0392 identifies a typical F-14A avionics suite for application and demonstration of the GPMS concept. This phase of the study concentrated on the multiplexing of avionics signals as opposed to the previous phase which described power generation and distribution approaches. Next page

(Cont)

19 - Continued

- General Purpose Multiplex System (GPMS)
- MIL-STD 1553A

20 - Continued

A four terminal area multiplex scheme was selected to demonstrate multiplexing on an F-14A test aircraft. The compliment of power generation, power distribution and avionics multiplex equipment was revised to reflect the addition of GPMS and the installation in F-14A test aircraft No. 5. The requirements of each of the GPMS data terminals and their interfaces were identified. The design of data bus interface cards for future avionics encorporating MIL-STD-1553-A capability were developed and the volumes in a typical compliment of avionics were identified.

A

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ILLUSTRATIONS

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ABBREVIATIONS AND ACRONYMS

AAES	Advanced aircraft electrical system
AAI	Air-to-air identification
A/C	Aircraft
AIMIS	Advanced integrated modular instrumentation system
ACLS	Automatic carrier landing system
ACM	Air combat maneuver
A/D	Analog to digital
ADC	Air data computer
ADF	Automatic direction finding
ADI	Analog display indicator
AFCS	Automatic Flight Control System
AHRS	Attitude heading reference set
AICS	Air inlet control system
AIM	Air intercept missile
ALTM	Altimeter
APC	Approach power compensator
A/S	Air stream/Air speed
AUX BRK	Auxiliary brake
AWG-9	Phoenix Missile System
AWG-15	Weapon control system
BIRAM	Bit input random access memory
BL	Butt line
BRG	Braking
BT	Bus tie
CADC	Central air data computer
C&A	Caution & Advisory
CB	Circuit breaker
CCDP (CC&D)	Crew control and display panel
CCU	Cable control unit

CIACS	Central integrated armaments control system
CFG	Constant frequency generator
CMD	Command
CSD	Constant, speed, drive
CSDC	Computer signal data converter
DDD	Digital data display
DDI	Digital data indicator
D/A	Digital to analog
DECM	Defensive electronic countermeasures
DEMUX (DMUX)	Demultiplexer
DES	Designator
D/L	Data link
DT	Data terminal
EAC	Emergency ac contactor
ECM	Electronic countermeasures
ECMD	Electronic countermeasures display
EDC	Emergency dc contactor
ESS	Essential
ETI	Elapsed time indicator
EXT	External
EXC	External contactor
FDR	Feeder
FLT	Flight
FS	Fuselage station
GAC	Grumman Aerospace Corporation
GEN	Generator
GCU	Generator control unit
GPM	Ground power monitor
GPMS	General purpose multiplex system
HDG	Heading
HDL	Handle
HND BRK	Hand brake
HSD	Horizontal situation display
HUD	Heads-up display
HVDC	High voltage dc

ICS	Intercommunication system
IDENT	Identification
IDG	Integrated drive generator
IFF	Identification friend or foe
IFU	Interface unit (Part of AWG-9 computer system)
ILS	Instrument landing system
INS	Inertial navigation system
IMU	Inertial measurement unit
IR	Infrared
INTLK	Interlock
IRAM	Input random access memory
I/O	Input/Output
IWSFD	Integrated weapon systems functional diagrams
LDC	Left main d-c contactor
LED	Light emitting diode
LGRB	Left glove relay box
LGSE/LE	Lateral glide slope error/Lateral error
LMC	Left main contactor
LMLG	Left main landing gear
LSB	Least significant bit
LWOW	Left weight on wheels
MAG	Magnetic
MCB	Mid-compression bypass
MDIG	Multiple display indicator group (HSD and ECMD)
MDR	Multiplexer driver receiver
MLG	Main landing gear
MMD	Master monitor display
MUX	Multiplexer
MSB	Most significant bit
MSL	Missle
MTBF	Mean time before failure
MU	Master unit (processor)
NADC	Naval Air Development Center
NAV	Navigation

NFO	Naval Flight Officer
NLG	Nose landing gear
OBC	Onboard checkout
ORAM	Output random access memory
OVSP	Over speed
PCD	Precision course direction
PGS	Power generating system
PP	Pilots panel
PROM	Programmable read only memory
PMS	Phoenix Missile System
QAD	Quick assembly disconnect
RAM	Random access memory
RCCB	Remote controlled circuit breaker
RDC	Right main dc contactor
RDR ALT	Radar Altimeter
REL	Reliable
RIT	Remote input terminal
RGRB	Right glove relay box
ROM	Read only memory
ROT	Remote output terminal
RMC	Right main contactor
RMLG	Right main landing gear
RNG	Range
RWOW	Right weight on wheels
SAS	Stability Augmentation System
SINS	Ships Inertial Navigation System
SIU	Standard interface unit
SIP	Serial input
SOP	Serial output
SOSTEL	Solid state electric logic
SPD	Speed
SSPC	Solid state power controller
TAS	True airspeed
TACAN	Tactical air navigation

TID	Tactical information display
TR	Transmit receive, transformer rectifier
TTG	Time to go
UMB	Umbilical
VDI	Vertical display indicator
VDIG	Vertical display indicator group (HUD and VDI)
VGSE/VE	Vertical glide slope error/Vertical error
VSCF	Variable speed constant frequency
WCS	Weapon control system
WL	Water line
WOW	Weight on wheels
WRA	Weapon replaceable assembly

Section 1

INTRODUCTION AND SUMMARY

This is the addendum to the final engineering report describing work performed by Grumman Aerospace Corporation under Naval Air Development Center Contract N62269-75-C-0392 of 30 June 1975. The first part of this report was submitted in July 1976. It identified the requirements and established a prototype design for the installation of an Advanced Aircraft Electrical System (AAES) in an F-14 test aircraft. This system utilizes a new electrical generator (High Voltage DC (HVDC)) for primary electrical power. It utilizes the Solid State Electric Logic (SOSTEL) system for power distribution, control, management, and protection. It employs MIL-STD-1553A data bus concepts for information transfer and control. The use of a General Purpose Multiplex System (GPMS) data terminals was restricted to the SOSTEL Master Unit interfaces and to those F-14 transducers and low power control signals which would be difficult or cumbersome to adapt to the SOSTEL remote terminal interface requirements.

This portion of the study was initiated in January 1977. It identifies a representative F-14 avionics suite selected for incorporation in a GPMS avionics multiplex system. The interfaces selected are presently serviced by the Computer Signal Data Converter (CSDC) and portions of the AWG-9 system.

The CSDC provides interface compatibility, computations, mode switching and on-board checkout in the present F-14 design. As such, it provides a centralized multiplexing point for the transfer of information between much of the aircraft avionics.

A system containing four GPMS area data terminals was selected as the approach to demonstrate GPMS on an F-14 AAES flight test aircraft. The four terminal system was selected since it allows for subsequent design development to include system redundancy and growth. The existing avionics which the data terminals must interface with will not require modification. Modification would have incurred costs which could not be justified for a system solely intended to demonstrate GPMS. This rationale also led to rejection of approaches which would have necessitated the inclusion of data bus interfaces in existing avionics. However, new aircraft or aircraft undergoing major avionics modification must have avionics which incorporate data bus interfaces for this information transfer technique to be efficient. In addition, the approach selected allows a performance comparison of the existing system with the GPMS system by reinstallation of the CSDC. The design is compatible but independent of the SOSTEL terminals of AAES. The avionics interfaces cover the range of signal types (discretes, serial digital, pulse, dc and ac analogs) which are typical of aircraft equipments.

The CSDC interface signals and functions were analyzed and tabulated. Functional drawings describing the present and proposed system were developed. The design of each data terminal was blocked out along with the actual and estimated parts required. The size of each terminal was determined. An estimate of the memory requirements was generated. A revised AAES system configuration was generated. This revision is primarily affected by consolidating MUX, DMUX, and SSPC functions, and the addition of the four GPMS area data terminals. A revised installation for the equipment was developed, based upon utilization of a test aircraft configured similar to the No. 5 F-14. The data bus message transfer requirements between the data terminals were synthesized. The message groups developed were organized to meet the data update requirements between the avionic users. Data bus usage is less than 15% of a single channel's capacity. An investigation of a number of F-14 avionics was performed to evaluate which equipments in a future design could absorb the bus interface electronics required to interface to a data bus system. Most equipment investigated would accommodate the two cards a data interface unit would require. A conceptual design of a future LSI device incorporating the necessary functional requirements along with the data, controls and status interfaces for a MIL-STD-1553A interface was generated.

Section 2

OBJECTIVES

The primary objectives of this phase of the AAES study are:

- Provide a design for the utilization and evaluation of a General Purpose Multiplex System (GPMS) on the F-14.
- The incorporation of GPMS should compliment the previous AAES study efforts and may modify that approach. However, the GPMS system and the SOSTEL system shall be capable of independent operation.
- The GPMS approach should be oriented about a typical aircraft suite of avionics and functions such that the design realistically evaluates GPMS concepts.
- Inherent in the objective is the basic fact that the F-14 aircraft is a test bed for the evaluation of AAES (PGS, SOSTEL, GPMS) concepts as opposed to being a unique design improvement under evaluation for future production F-14s.
- Subjective costs of various approaches, as related to modifications to existing avionics, quantity of GPMS terminals and complexity of interface and functions, should be factored in to establish a realistic but not overly ambitious approach.

Section 3

GPMS DESIGN

3.1 PRESENT F-14 SYSTEM

Figures 3-1 and 3-2 represent the existing signal and functional drawings of the interfaces considered during this portion of the study. They consist of the AWG-9 Computer Interface Unit (IFU) interface to the Vertical Display Indicator Group (VDIG), AWG-15 and the complete Computer Signal Data Converter (CSDC) interface. A description of the signal and functional interfaces between the various units follows.

3.1.1 IFU/VDIG

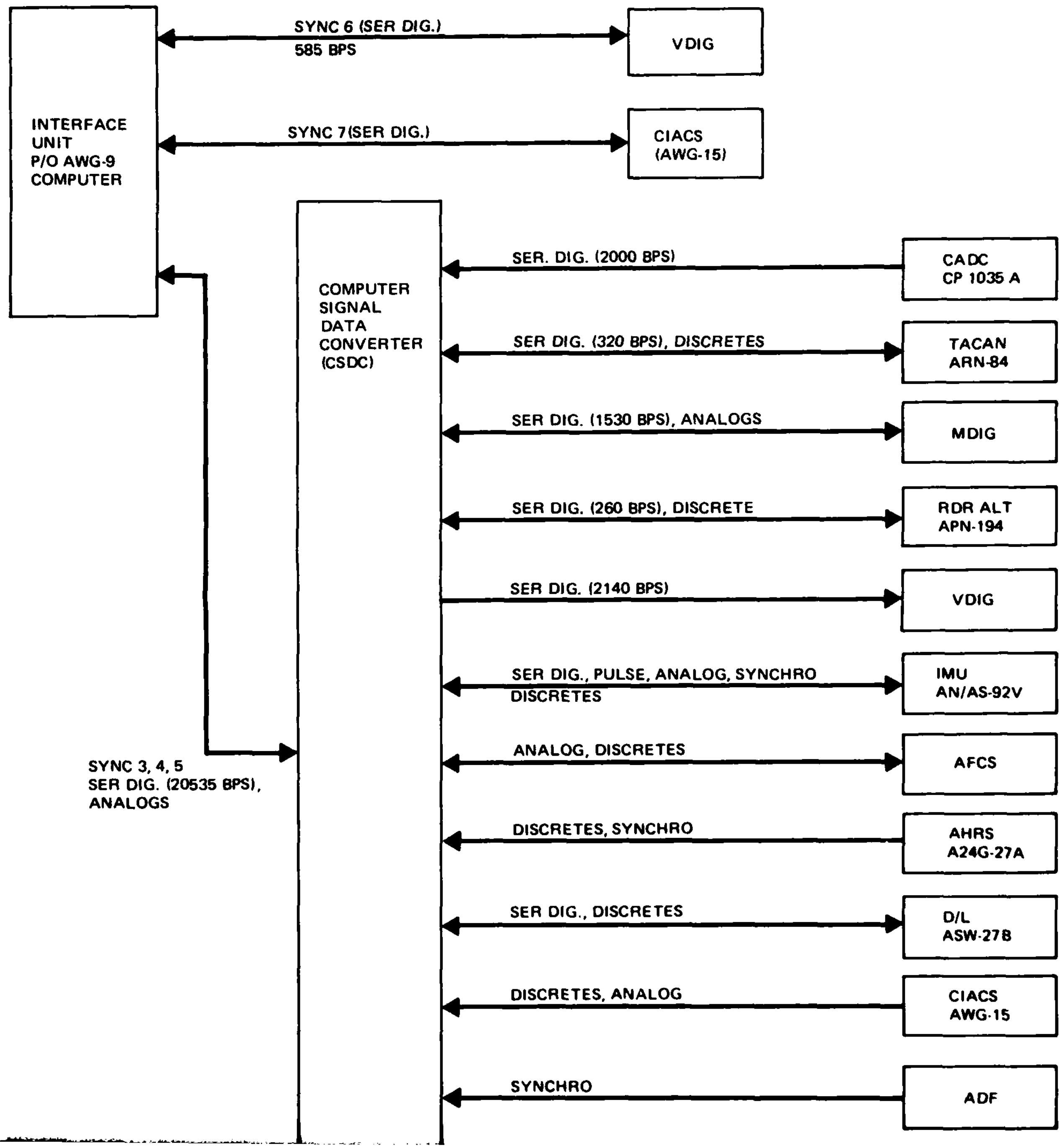
This interface is a serial digital data stream under control of the IFU. Serial Output (SOP) and Serial Input (SIP) information is transferred between the two units under a sync envelope utilizing clock pulses. Data is transferred NRZ in 32 bit words at 125 KHz rate. The SIP/SOP interface consists of four twisted wire pairs containing true and complement differential information of data in, data out, sync envelope, and clock. SIP input information to the IFU is delayed one data bit from the SOP output word to the VDIG, but is not an immediate response to the SOP message. The VDIG transmits command and mode information in one data word (SOP 0600) to the IFU, the IFU responds with the appropriate 1 of 13 data words (SIP0600 to SIP0612) containing display information.

3.1.2 IFU/AWG-15

This interface consists of a SIP/SOP channel utilizing sync 7 envelope. SOP/SIP0700 and 0701 provide missile command information to the AWG-15 and missile status information to the IFU.

3.1.3 IFU/CSDC

The IFU/CSDC interface consists of three SIP/SOP channels utilizing syncs 3,4, and 5, and two dc analog channels providing pitch and roll angles to the IFU. The serial digital SIP/SOPs provide a multiplexed interface between the IFU and the F-14



INTERFACE UNIT P/O AWG-9 COMPUTER
SYNC 6 (SER DIG.) 585 BPS
VDIG
SYNC 7(SER DIG.)
CIACS (AWG-15)
COMPUTER SIGNAL DATA CONVERTER (CSDC)
SYNC 3, 4, 5 SER DIG. (20535 BPS), ANALOGS
SER. DIG. (2000 BPS)
CADC CP 1035 A
SER DIG. (320 BPS), DISCRETES
TACAN ARN-84
SER DIG. (1530 BPS), ANALOGS
MDIG
SER DIG. (260 BPS), DISCRETE
RDR ALT APN-194
SER DIG. (2140 BPS)
VDIG
SER DIG., PULSE, ANALOG, SYNCHRO DISCRETES
IMU AN/AS-92V
ANALOG, DISCRETES
AFCS
DISCRETES, SYNCHRO
AHRS A24G-27A
SER DIG., DISCRETES
D/L ASW-27B
DISCRETES, ANALOG
CIACS AWG-15
SYNCHRO
ADF

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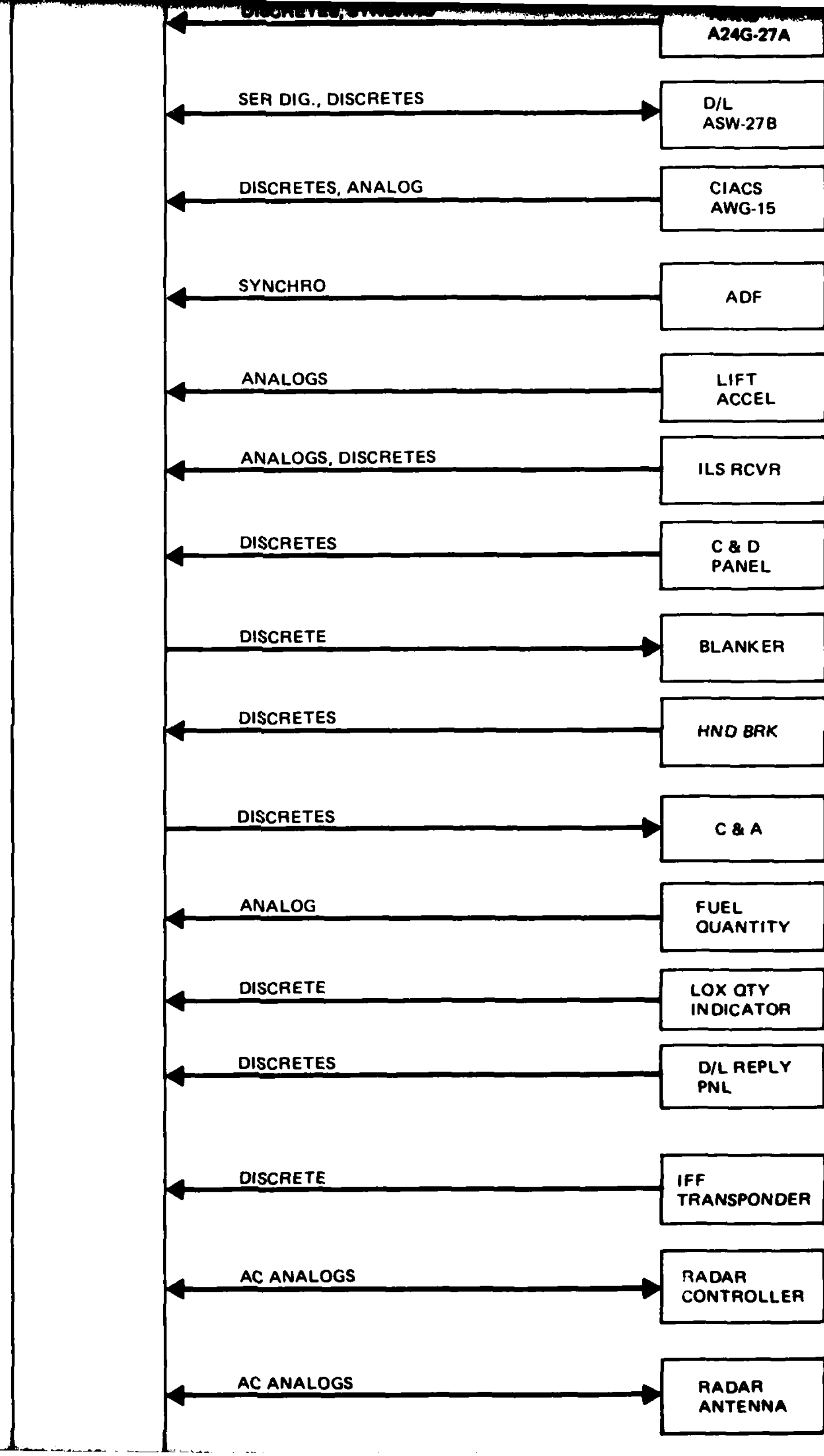


A24G-27A
SER DIG., DISCRETES
D/L ASW-27B
DISCRETES, ANALOG
CIACS AWG-15
SYNCHRO
ADF
ANALOGS
LIFT ACCEL
ANALOGS, DISCRETES
ILS RCVR
DISCRETES
C & D PANEL
DISCRETE
BLANKER
DISCRETES
HND BRK
DISCRETES
C & A
ANALOG
FUEL QUANTITY
DISCRETE
LOX QTY INDICATOR
DISCRETES
D/L REPLY PNL
DISCRETE
IFF TRANSPONDER
AC ANALOGS
RADAR CONTROLLER
AC ANALOGS
RADAR ANTENNA

3

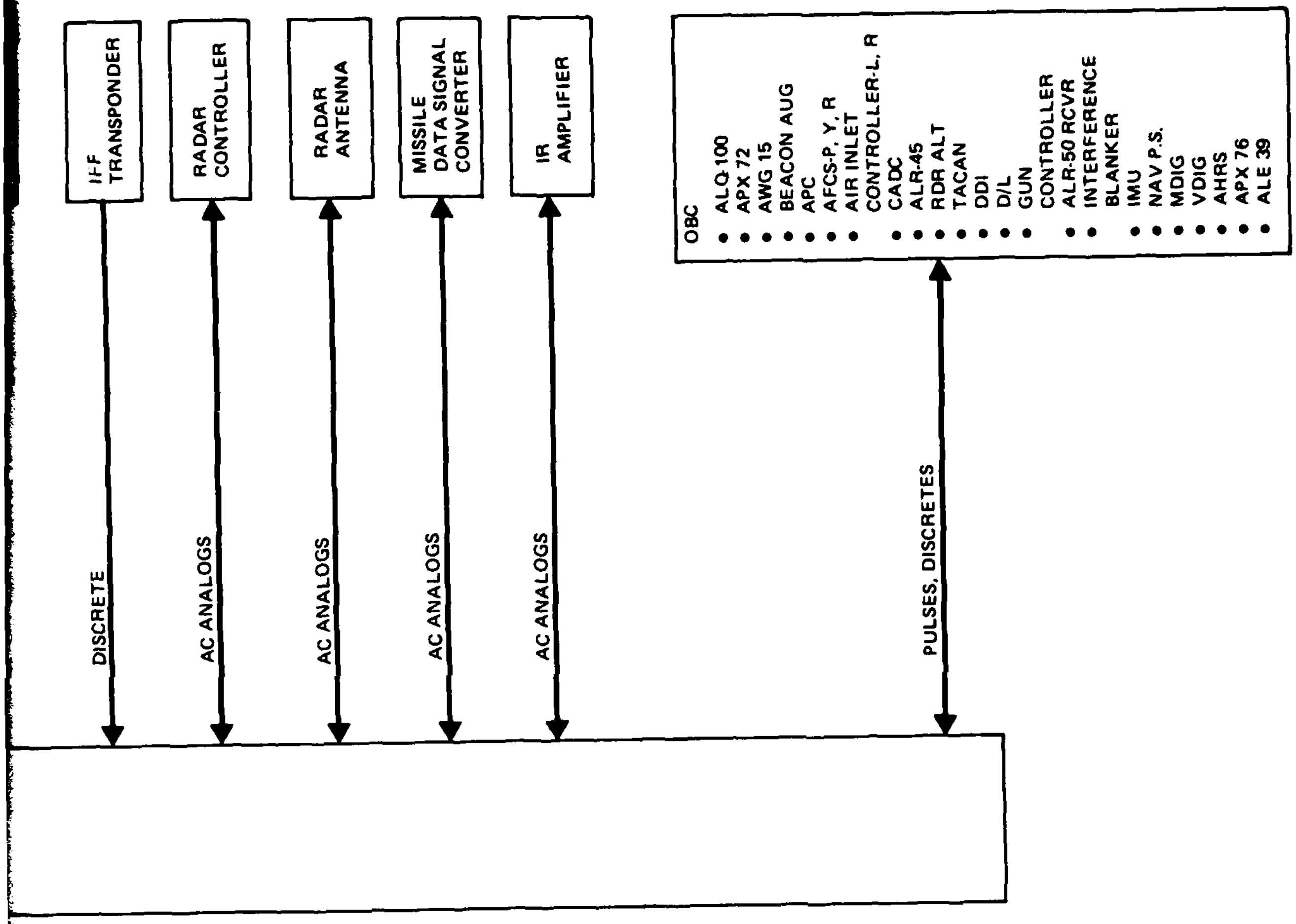
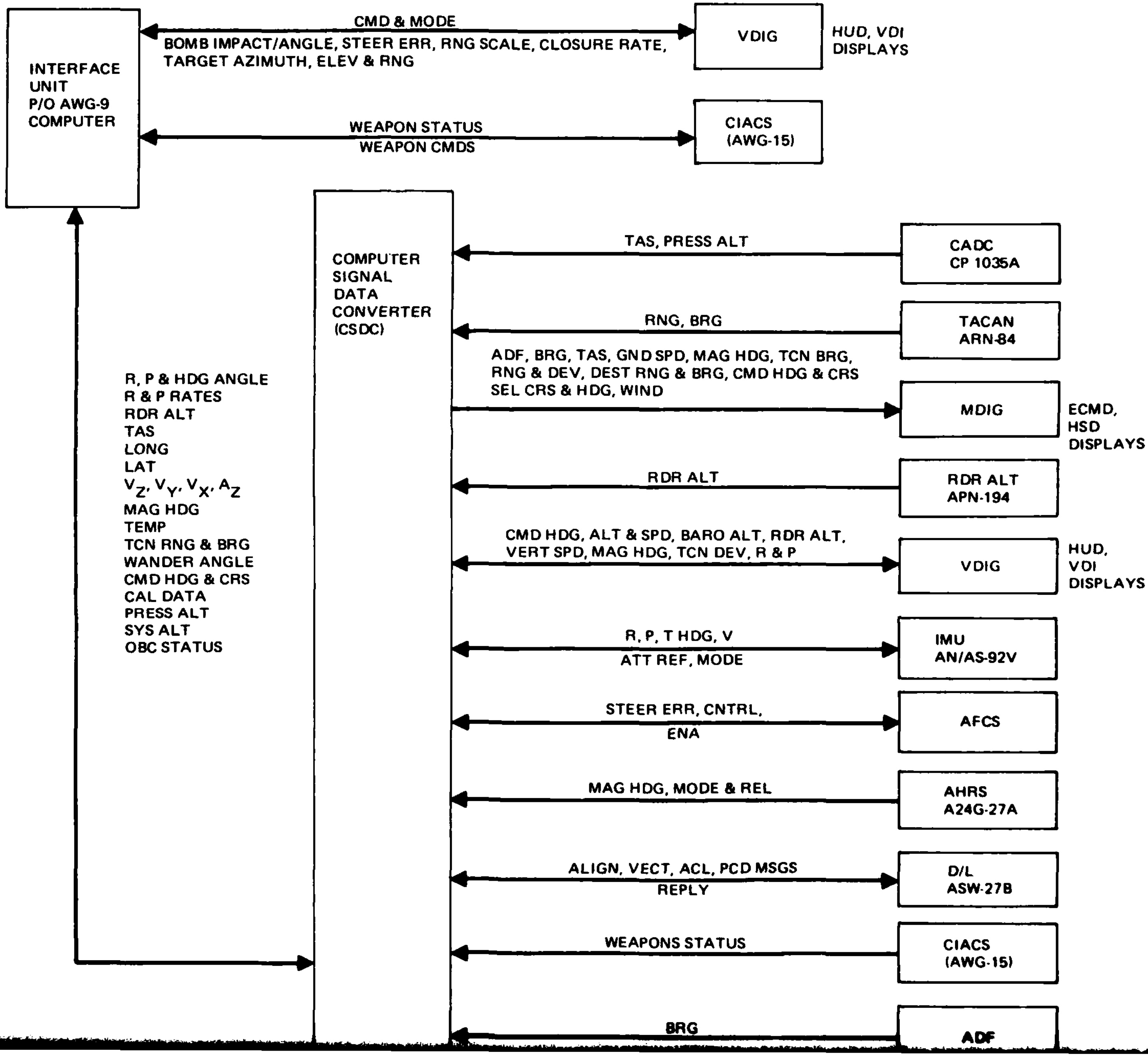


Figure 3-1 Existing F-14 CSDC/AGW-9 Signal Interface



INTERFACE UNIT P/O AWG-9 COMPUTER
CMD & MODE
BOMB IMPACT/ANGLE, STEER ERR, RNG SCALE, CLOSURE RATE, TARGET AZIMUTH, ELEV & RNG
VDIG
HUD, VDI DISPLAYS
WEAPON STATUS
WEAPON CMDS
CIACS (AWG-15)
COMPUTER SIGNAL DATA CONVERTER (CSDC)
R, P & HDG ANGLE
R & P RATES
RDR ALT
TAS
LONG
LAT
V_Z, V_Y, V_X, A_Z
MAG HDG
TEMP
TCN RNG & BRG
WANDER ANGLE
CMD HDG & CRS
CAL DATA
PRESS ALT
SYS ALT
OBC STATUS
TAS, PRESS ALT
CADC CP 1035A
RNG, BRG
TACAN ARN-84
ADF, BRG, TAS, GND SPD, MAG HDG, TCN BRG, RNG & DEV, DEST RNG & BRG, CMD HDG & CRS SEL CRS & HDG, WIND
MDIG
ECMD, HSD DISPLAYS
RDR ALT
RDR ALT APN-194
CMD HDG, ALT & SPD, BARO ALT, RDR ALT, VERT SPD, MAG HDG, TCN DEV, R & P
VDIG
HUD, VDI DISPLAYS
R, P, T HDG, V
ATT REF, MODE
IMU AN/AS-92V
STEER ERR, CNTRL,
ENA
AFCS
MAG HDG, MODE & REL
AHRS A24G-27A
ALIGN, VECT, ACL, PCD MSGS
REPLY
D/L ASW-27B
WEAPONS STATUS
CIACS (AWG-15)
BRG
ADF

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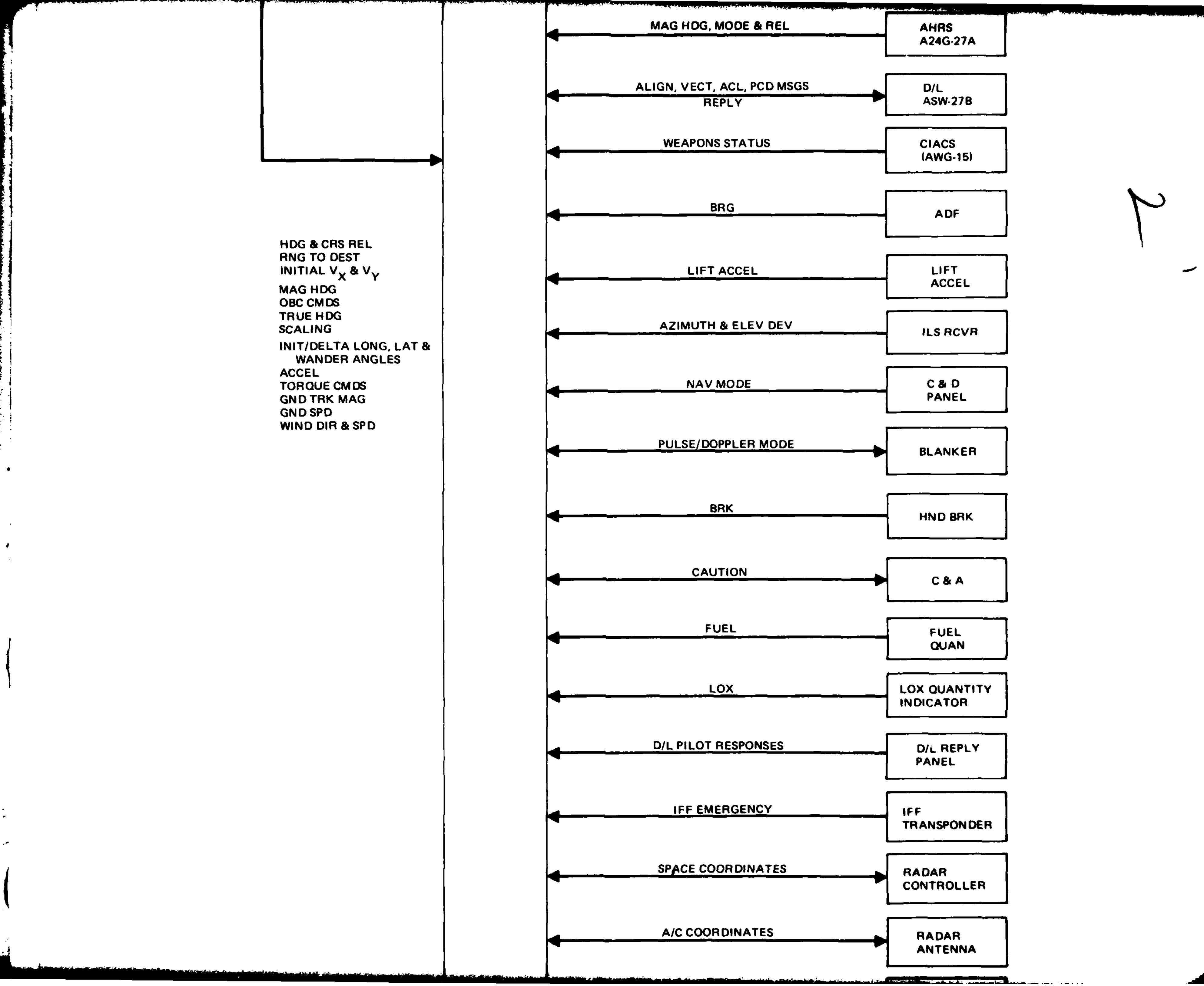
AHRS A24G-27A
MAG HDG, MODE & REL
D/L ASW-27B
ALIGN, VECT, ACL, PCD MSGS
REPLY
CIACS (AWG-15)
WEAPONS STATUS
ADF
BRG
LIFT ACCEL
LIFT ACCEL
ILS RCVR
AZIMUTH & ELEV DEV
C & D PANEL
NAV MODE
BLANKER
PULSE/DOPPLER MODE
HND BRK
BRK
C & A
CAUTION
FUEL QUAN
FUEL
LOX QUANTITY INDICATOR
LOX
D/L REPLY PANEL
D/L PILOT RESPONSES
IFF TRANSPONDER
IFF EMERGENCY
RADAR CONTROLLER
SPACE COORDINATES
RADAR ANTENNA
A/C COORDINATES
HDG & CRS REL
RNG TO DEST
INITIAL V_X & V_Y
MAG HDG
OBC CMDS
TRUE HDG
SCALING
INIT/DELTA LONG, LAT & WANDER ANGLES
ACCEL
TORQUE CMDS
GND TRK MAG
GND SPD
WIND DIR & SPD

3

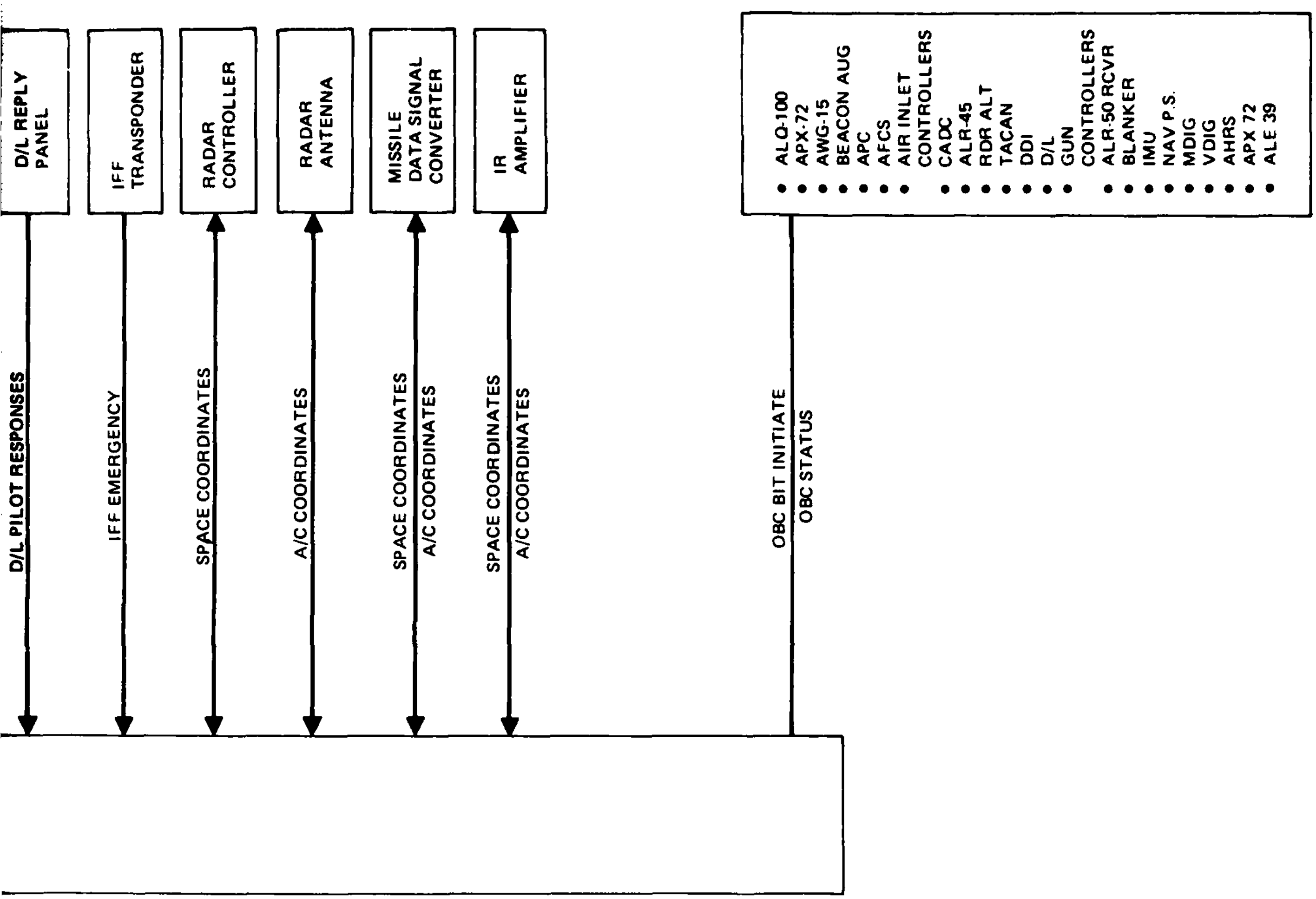

Figure 3-2 Existing F-14 CSDC/AWG-9 Function Diagram

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avionics to which the CSDC interfaces. The CSDC provides signal timing, formatting, switching, general purpose computational capabilities and interface compatibility between the F-14 avionics equipments. As such, it is a central element in providing navigational computations and switching, onboard checkout (OBC) and signal conversions. The CSDC/IFU serial digital interface transfers the following information at 8, 32 or 128 per second intervals:

To IFU	To CSDC
• Roll, Pitch & Heading Angles	• Heading & Course Relative
• Roll & Pitch Rates	• Range to Destination
• Radar Altitude	• Initial Velocities
• True Airspeed	• Magnetic Heading
• Longitude	• OBC Commands
• Latitude	• True Heading
• Roll, Pitch & Heading Velocity	• Scaling
• Vertical Acceleration	• Initial/Delta Latitude
• Temperatures	• Initial/Delta Wander Angles
• TACAN Range & Bearing	• Acceleration
• Wander Angle	• Torquing Commands
• Command Heading & Course	• Ground Track Magnetic
• Calibration Data	• Groundspeed
• Pressure Altitude	• Wind Direction
• System Altitude	• Windspeed
• OBC Status	

3.1.4 CADC/CSDC

The Central Air Data Computer (CADC) interface to the CSDC is a one-way serial digital interface from the CADC to the CSDC under control of the CADC. The interface consists of a sync envelope, data, clocks, and their respective complements.

Information is transferred 20 times a second utilizing a 24 bit data word. The following functional information is transferred to the CSDC:

- Pressure Altitude Rate
- True Airspeed
- Mach Number
- True Angle of Attack
- Free Airstream Temperature
- Pressure Altitude
- Indicated Airspeed.

3.1.5 TACAN/CSDC

The Tactical Air Navigation (TACAN) system interface to the CSDC consists of a serial digital data interface from the TACAN under control of the CSDC. The CSDC provides this control by transmitting envelope, read and clocking signals; information is transmitted 20 times per second and consists of station range and bearing.

3.1.6 MDIG/CSDC

The Multiple Display Indicator Group (MDIG) which consists of the Horizontal Situation Display (HSD) and the Electronic Counter Measures Display (ECMD) provides two dc analog signals to the CSDC and receives serial digital data from the CSDC. The serial digital data interface consists of differential data, clock and envelope. The data words contain 31 bits and information is updated at a 10 per second rate. The analog signals to the CSDC provide Sine and Cosine Manual Command Course information. The serial interface provides the following display information to the MDIG:

- Magnetic Heading
- Groundspeed
- Wind Direction
- Command Heading
- Command Course

- Range to Destination
- True Airspeed
- TACAN Deviation & Bearing
- Relative TACAN Bearing & TACAN Range
- MDIG Symbol Word.

3.1.7 Radar Altimeter/CSDC

The Radar Altimeter provides radar altitude to the CSDC in a 20 bit serial digital differential data word. The CSDC provides information transfer control by providing a read envelope and clocking signals. The information is updated at a 20/second rate.

3.1.8 VDIG/CSDC

The CSDC transmits serial digital data to the VDIG on a one-way channel under control of the CSDC. A differential envelope, clock and data path is utilized to provide the VDIG, which consists of the Heads Up Display (HUD) and Vertical Display Indicator (VDI) with display information. The information is updated at a rate of 20 per second. This display information consists of:

- Command Airspeed Error
- Instrument Landing System Vertical Error
- Instrument Landing System Lateral Error
- Time to Go
- Reticle Manual Elevation
- TACAN Deviation
- True Angle of Attack
- Vertical Glide Slope Error
- Command Heading Relative
- Pressure Altitude Rate
- Sine & Cosine Roll
- Pressure & Radar Altitude

- Command Altitude Error
- Lateral Glide Slope Error/Lateral Error
- Aircraft Pitch & Command Airspeed
- Magnetic Heading & Command Altitude
- Weapon Types Selected
- Weapon Quantity Reading
- Weapon Status
- Navigation Mode
- Data Link Status.

3.1.9 IMU/CSDC

The Inertial Measurement Unit (IMU) interface to the CSDC consists of serial digital, analog, discrete and pulse train signals. A serial digital 22 bit calibration data word is transmitted to the IMU under control of the CSDC, which provides envelope and clocking signals. The IMU transmits a roll and pitch 3-wire synchro and two 4-wire heading resolver signals to the CSDC. Three axis torquing pulses are transmitted to the IMU in true and complementary form on three wire pairs. Three axis accelerometer pulse trains are transmitted to the CSDC in true and complement form along with an accelerometer clocking signal for timing. Four discretes are transmitted to the IMU from the CSDC for mode control. Five discretes from the IMU provide IMU status. The IMU is a three axis, four gimbal, all attitude unit containing gyros, accelerometer and associated electronics. The accelerometers provide the basic interial navigation signals necessary for navigational information. As such, the IMU is the primary unit for aircraft inertial navigation. Two backup modes are provided utilizing combination of the IMU, AHRS and CADC information.

3.1.10 AFCS/CSDC

The Automatic Flight Control System (AFCS) interface to the CSDC consists of three discretes from the AFCS to enable steering error computations. The CSDC provides four steering validity discretes and a dc analog steering error signal. The steering error signal may be clutched magnetic heading error derived from AHRS or

AWG-9 backup magnetic heading; clutched ground track error derived from AWG-9 ground track magnetic; or command heading error derived from data link command heading and AWG-9 ground track angle.

3.1.11 AHRS/CSDC

The Attitude Heading Reference Set (AHRS) interface supplies the CSDC with three 3-wire synchro inputs (Roll, Pitch, Heading) and three discrete status lines. The AHRS provides backup roll and pitch information for navigation in the event of a inertial navigation system failure. It provides primary magnetic heading information.

3.1.12 DL/CSDC

The Data Link (D/L) interface to the CSDC is comprised of serial digital and discrete interfaces. The D/L provides two envelope signals and two 42 bit data words containing odd and even data link information. The CSDC provides two gated shift clock lines to control the receipt of odd and even data. The CSDC provides a 42 bit data word reply message along with a clocking signal of gated pulses. A D/L tilt status discrete provides indication of D/L message validity. Nine D/L messages to the CSDC and the reply message to the D/L contain the following functional information:

<u>To CSDC</u>

- Command Altitude
- Command Airspeed
- Command Heading
- Time to Go
- Vertical Glide Slope Error or Vertical Error
- Lateral Glide Slope Error or Lateral Error
- Discrete Messages
- Altitude Scale

<u>To D/L</u>

- Aircraft Heading
- Weapon Status
- Aircraft Altitude
- Altitude Scale
- True Airspeed
- Fuel Status
- Encoded Discretes
- Aircraft Type

3.1.13 CIACS/CSDC

The CIACS (armament panel and elevation lead panel) provides seven discretes and one dc analog. The discretes are coded to identify weapon type selected and weapon quantity ready. The analog elevation lead angle provides manual mode offset of the HUD sighting pipper.

3.1.14 ADF/CSDC

The Automatic Direction Finder (ADF) provides a 3-wire synchro to the CSDC. This synchro provides ADF bearing to the MDIG displays.

3.1.15 Lift Accelerometer/CSDC

The Lift Accelerometer provides lift acceleration in the form of a dc analog to the CSDC. Lift acceleration is transmitted to the AWG-9 IFU.

3.1.16 Blanker/CSDC

The Interference Blanker receives a discrete from the CSDC identifying Pulse/Doppler mode.

3.1.17 Fuel Quantity Sensor/CSDC

The Fuel Quantity Sensor provides a dc analog to the CSDC for conversion and transmission in the D/L reply message.

3.1.18 Lox Quantity Indicator/CSDC

The Lox Quantity Indicator provides a discrete input indicating low lox status. This information is supplied in the reply message to the D/L.

3.1.19 DL Panel/CSDC

The D/L reply panel provides six discretes (NFO switch initiated) which are transmitted to the D/L in the reply message.

3.1.20 IFF/CSDC

The IFF transponder, IFF transponder control unit and ejection seat switches provide an OR'ed discrete identifying an emergency condition which is transmitted to the D/L in the reply message.

3.1.21 Coordinate Transformations

The CSDC provides four sets of three direction cosine signals for use by the IR amplifier, radar antenna, radar controller and missile auxiliaries. The CSDC has one channel available for conversion of IR amplifier space stabilized coordinates to aircraft coordinates. The CSDC receives space stabilized coordinates for use by the radar antenna. It receives aircraft coordinates from the radar antenna and converts them to space stabilized coordinates which are transmitted to the radar controller. It provides a channel of earth stabilized coordinates to aircraft coordinates for the missile data signal converter. All channels except the IR amplifier channel have conversion bypass capability. Coordinate conversions are accomplished by digitally modifying the analog resolver signals with IMU/AHRS pitch, roll and heading information.

3.1.22 OBC

The CSDC performs onboard checkout of the F-14 avionics. Discrete failure indications are automatically coded and transferred to the AWG-9 IFU. Commanded BIT is initiated and terminated under command of AWG-9 IFU(SOP0500). All OBC information is transferred to the IFU on serial interface SIP0501-0505 for fault analysis. F-14 OBC interfaces and operation can be divided into five classes:

- Continuously monitored information
- Command initiated, in flight test only
- Command initiated, ground test, pilot OBC selected
- Command initiated, ground test only
- Command initiated, in-flight and ground test.

3.2 PROTOTYPE AAES SYSTEM

The prototype AAES system identified in the July 1976 portion of this report has been revised and is illustrated in Figure 3-3. The primary considerations for revising the system are:

- The addition of four area GPMS data terminals to provide for the incorporation of the avionics interfaces identified in this phase of the study.
- The identification of an AAES test bed aircraft configured as in the No. 5 F-14. This test vehicle does not contain an AWG-9 system or gun; as a result, large equipment volumes are available for AAES installation even though some portions of the AWG-9 system must be installed.
- Incorporation of cable controllers and pilot's panel.

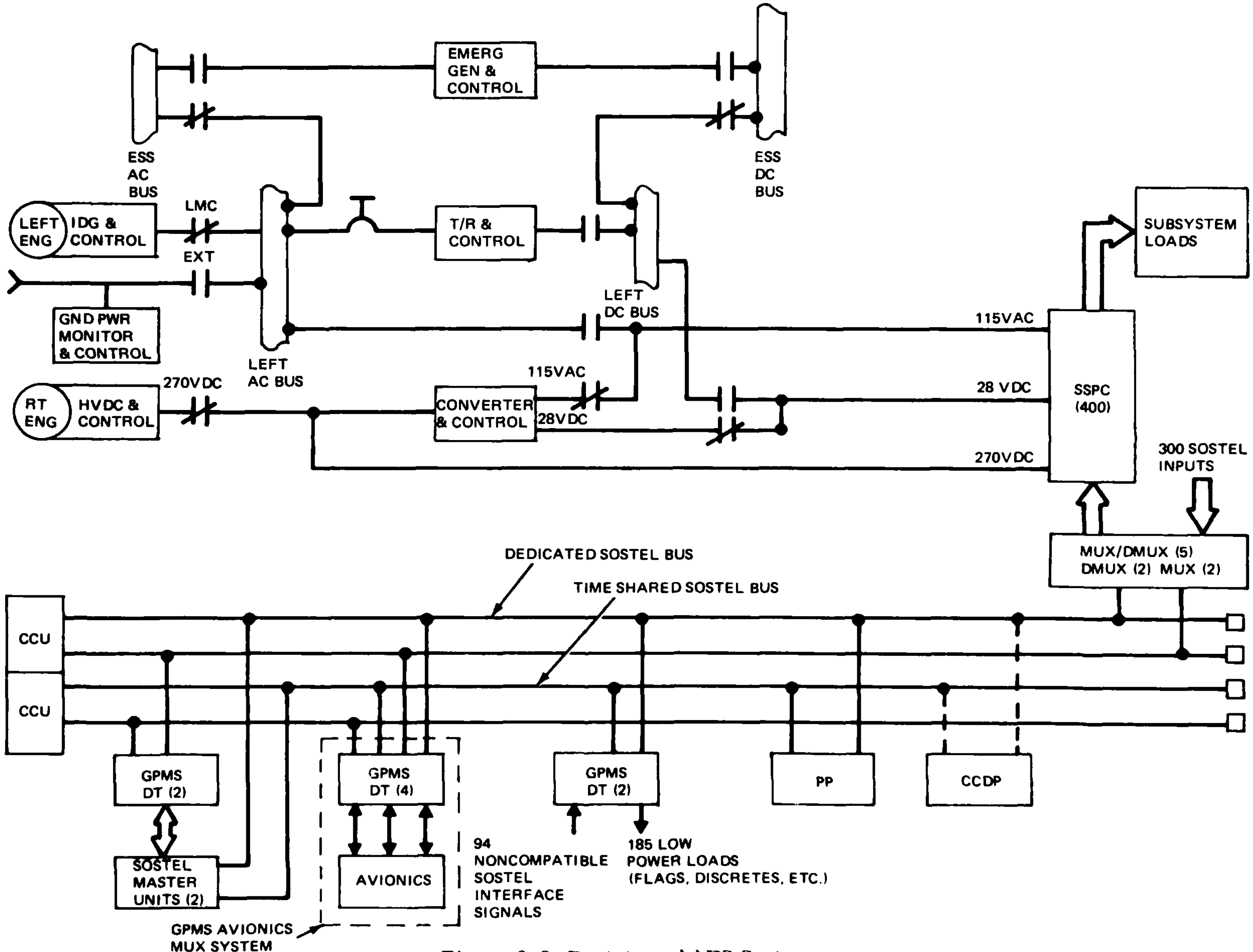


Figure 3-3 Prototype AAES System

- Consolidation of the SSPCs and some SOSTEL terminals into two locations: one forward of the pilot and one aft of the NFO.
- A revision of the number and mix of SOSTEL remote terminals (MUX, DMUX and MUX/DMUX). Greater emphasis is placed on the use of MUX/DMUX (5) while still maintaining 2 MUX and 2 DMUX for evaluation purposes. The revised configuration provides for the 302 MUX inputs and 386 DMUX outputs identified previously with 38% and 15% growth capability, respectively.
- The outline dimensions for AAES equipments were adjusted to the values identified in the SOSTEL procurement specifications. The GPMS data terminals were established utilizing the Grumman data terminal complement of components and an estimate of the user interface components.

In addition, the following guidelines were adopted:

- The SOSTEL system should be independent of the GPMS avionics equipment complement. This would allow SOSTEL operation with or without GPMS onboard the aircraft.
- The present CSDC cabling would be capped and stowed to allow the CSDC to be reinstalled for comparison with its GPMS replacement.

The resultant revised complement of equipment is as follows:

- Cable Control Units (2)

Each servicing two data bus cables by providing bus offer messages and monitoring bus utilization.

- GPMS Data Terminals (8)

Two data terminals service the SOSTEL Master Units. These two units are configured to provide two channel data bus service to the MUs. Each of these require two MU serial interface cards besides the control/timing and multiplex driver/receiver sections. An additional two data terminals provide inputs and output user interfaces for unique SOSTEL signals. The inputs and outputs for these terminals were identified in the previous report. They consist of low power output signals (discretes, flags, relays, etc.) which would not justify the use of solid state power controllers, and SOSTEL input signals which would require cumbersome conditioning circuitry to to modify for SOSTEL impedance type interfaces. Four data terminals were added as a result of this portion of the study and provide the interface between the avionics suite selected for demonstration of GPMS.

- Master Units (2): No change from previous AAES prototype design.
- Pilot's Panel (1), CCDP (1): No change from previous AAES prototype design. CCDP may be a nonflight plugable unit for ground test and checkout.
- MUX (2), DMUX (2), MUX/DMUX (5): Reconfigured mix of these remote units with greater utilization of MUX/DMUX components.
- Solid State Power Controller (400): Controller installation along with their DMUX interfaces have been consolidated into two compartments starboard forward and aft of the pilot and NFO, respectively. Four hundred SSPCs were identified as a result of the previous study effort based upon a full-up complement of F-14 avionics.
- Transducers (300): No change from previous AAES prototype design.

3.3 GPMS AVIONICS CONFIGURATION

The GPMS avionics system identified during this effort is configured about the use of four area multiplex data terminals. These data terminals have been assigned designations DT1, DT2, DT3 and DT4. A block diagram of the proposed configuration and their associated users is illustrated in Figure 3-4. The present F-14 avionics interfaces contain a significant amount of multiplexing as evidenced by the present CSDC, AWG-9 IFU, VDIG, MDIG, etc., designs. A number of system approaches were initially considered as illustrated by Figure 3-5 and Figure 3-6. These were rejected as being overly ambitious for a flight test program oriented about demonstrating the general applicability of the GPMS system. They would require considerable support by the F-14 avionics suppliers, thus incurring costs which may not be justified solely for the aims of this program. They are more in line with updating the avionics complement of the F-14 aircraft for future production and modification of the present fleet complement of F-14s. When data bus systems are considered solely as a communication system between the subsystems and avionics of an aircraft without consideration of the other functional requirements (improved air-to-air, air-to-ground, maintainability, etc.) they usually are not cost effective.

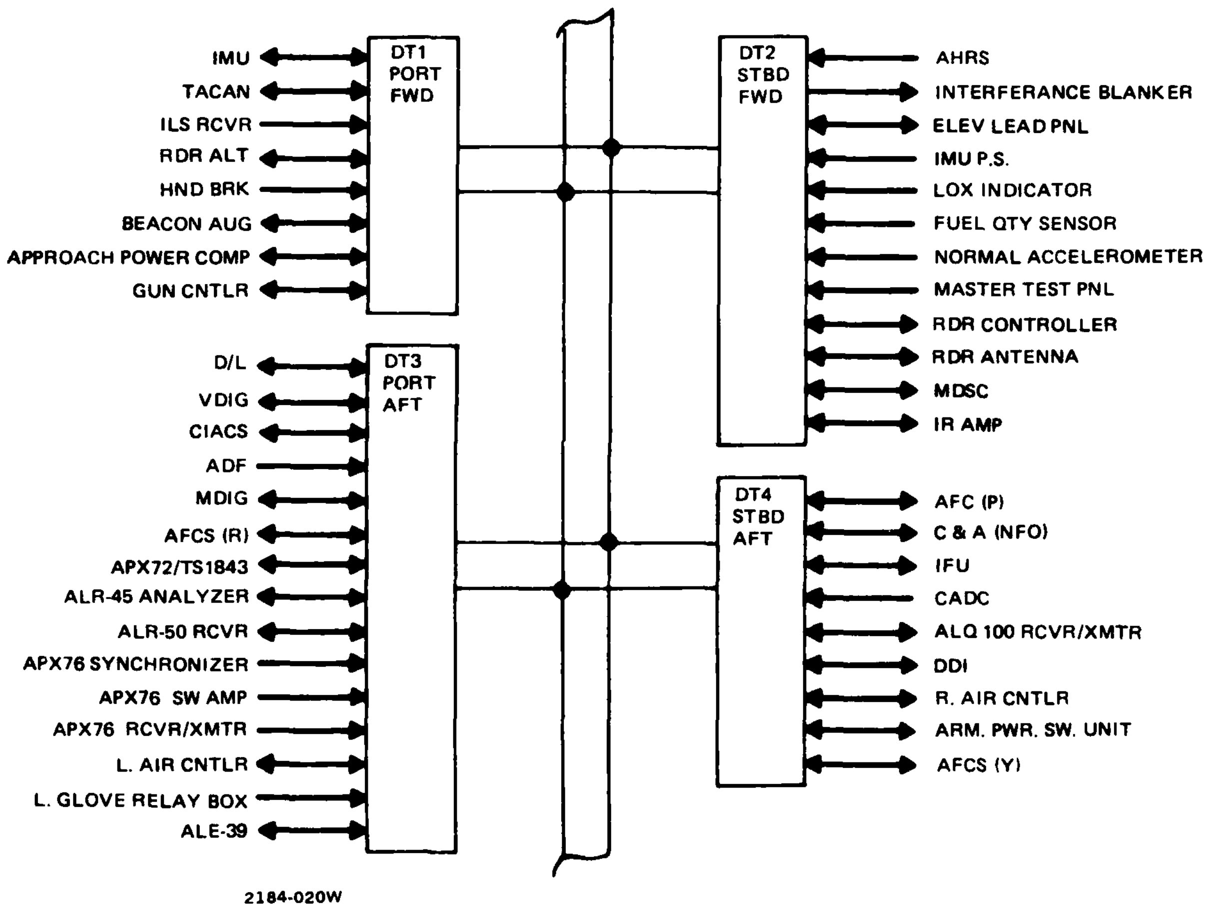


Figure 3-4 Area MUX Configuration

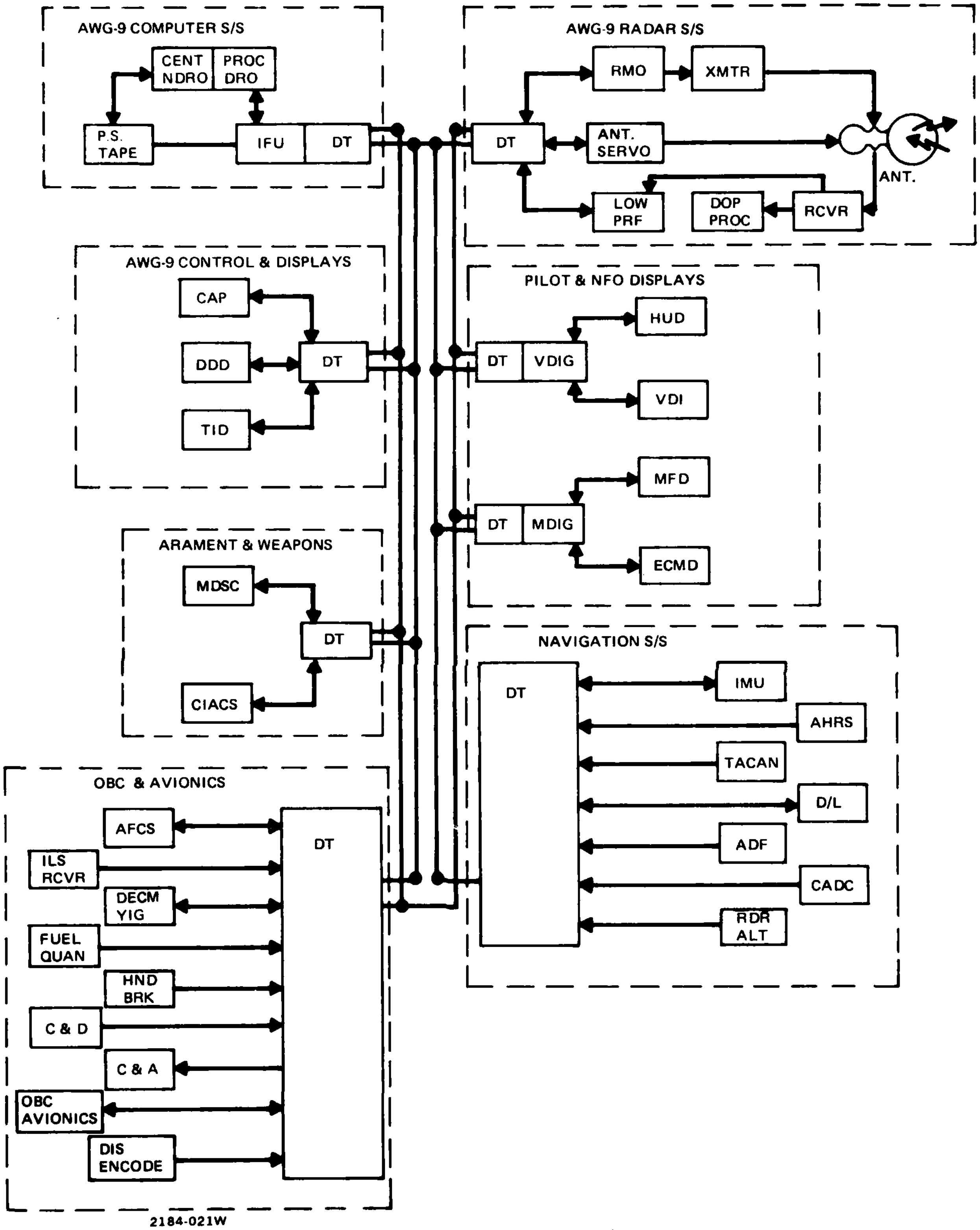


Figure 3-5 Functional MUX Configuration

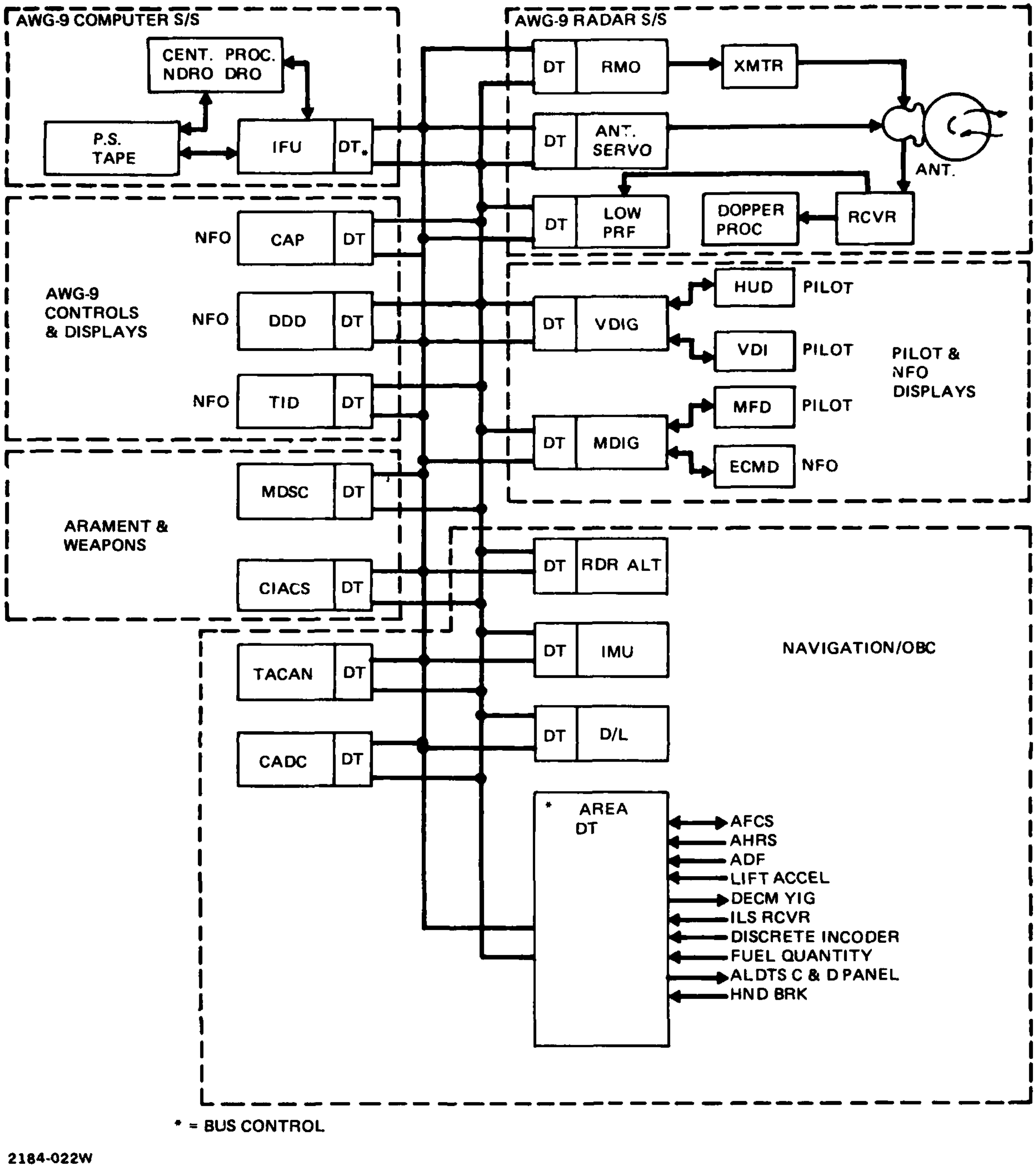


Figure 3-6 Dedicated MUX Configuration

When considered as part of an overall aircraft avionics update (new aircraft, or conversion in lieu of production (CILOPS)) a data bus system is advantageous as it leads to a standardized communication approach. This is particularly true as future equipment will be designed with data bus compatible interfaces. Figure 3-7 illustrates a data bus organized system specifically oriented about on F-14 CILOPS configuration.

To arrive at the proposed four data terminal GPMS test configuration, the CSDC/IFU interfaces and functions were analyzed and tabulated (see Appendix A). This tabulation is oriented about the functional aspects of signal flow as opposed to the electrical interface. Thus, all functional interfaces under SIP03 (items 2 through 14) time share the same serial electrical interface using the SIP03 envelope, clock and data lines. A total of 311 functional interfaces were tabulated. The present CSDC/IFU user interface and the GPMS data terminal interface for each signal are listed. The figures referred to in the comments column can be found in Appendix B. These figures were generated to provide an insight into the functional requirements each of the data terminals is required to perform based upon the present interface requirements. In addition, they identified the data bus information flow required by each of the data terminals. These requirements are summarized for each data terminal in Figures 3-8 through 3-11 (DT1 to DT4 user electrical interface) and Figures 3-12 through 3-15 (DT1 to DT4 functional interface). From this data base, information was derived to characterize the GPMs system and each of the data terminals.

Table 3-1 summarizes the significant data terminal characteristics.

3.4 DATA TERMINAL PARAMETERS

3.4.1 Data Terminal Configuration

The design of the four data terminals (DT1, DT2, DT3 and DT4) are characterized in Table 3-1 and is based upon Grumman's effort associated with MIL-STD-1553A data bus systems. Central to this effort is the application of microprocessor technology to the individual data terminals. In this configuration, the microprocessor (Intel 3000) is required to provide the bus protocol functions of MIL-STD-1553A in addition to servicing the users. A block diagram of the general layout of the data terminals is illustrated in Figure 3-16. The data terminals are divided into three sections.

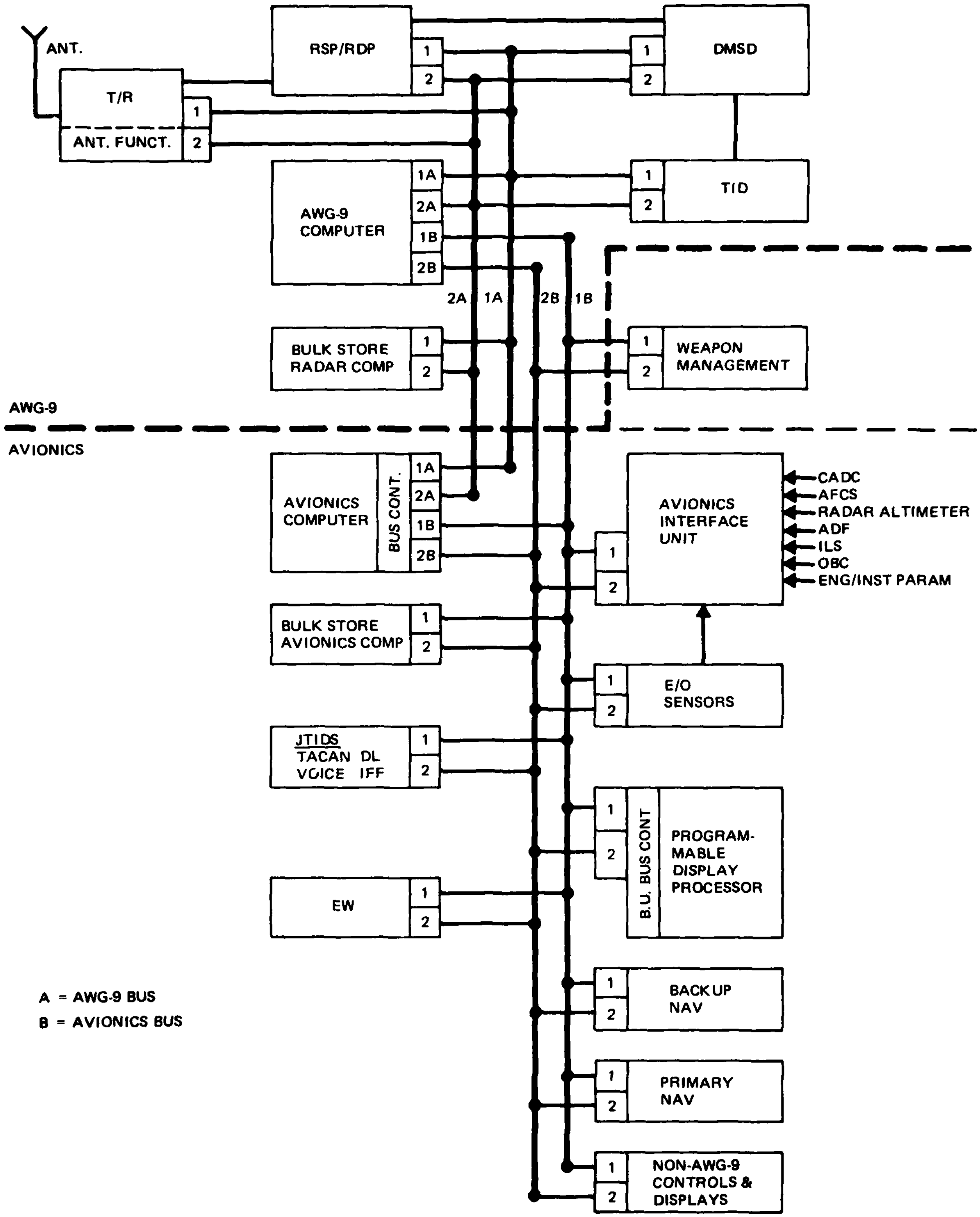


Figure 3-7 Typical F-14 CILOPS Configuration

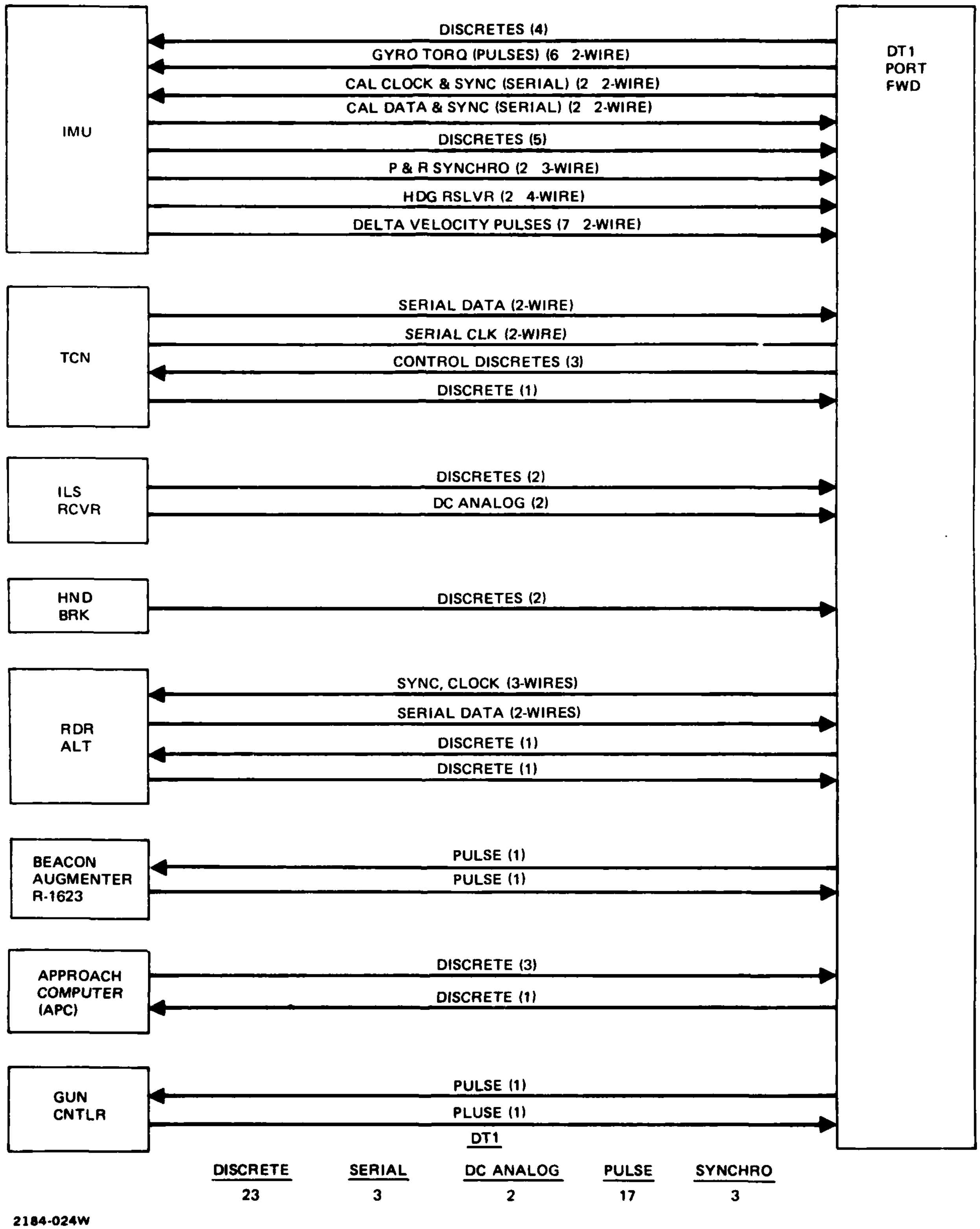
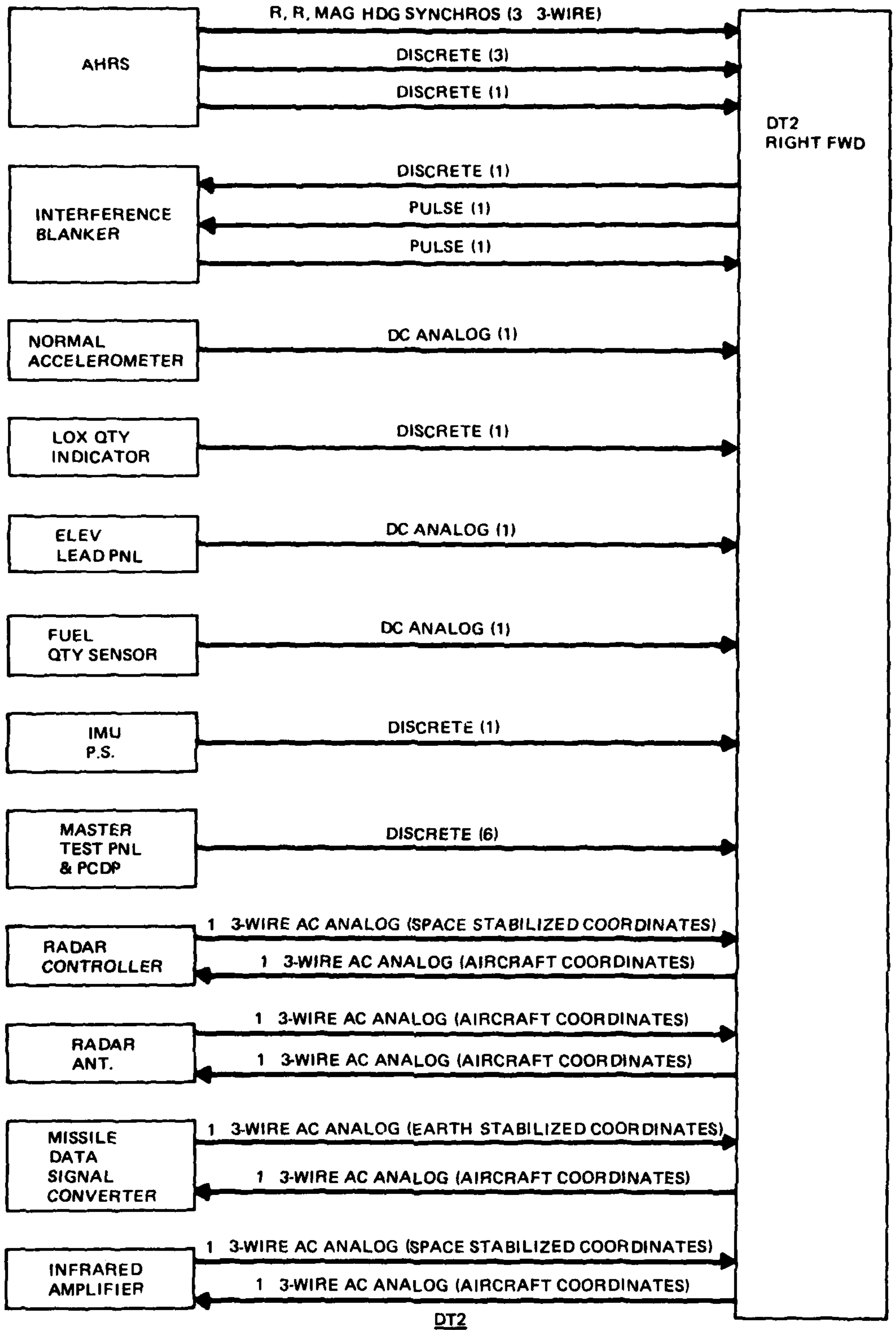


Figure 3-8 DT1 User Electrical Interface



DT2		
DISCRETE	DC/AC ANALOG	PULSE
13	14	2

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Figure 3-9 DT2 User Electrical Interface

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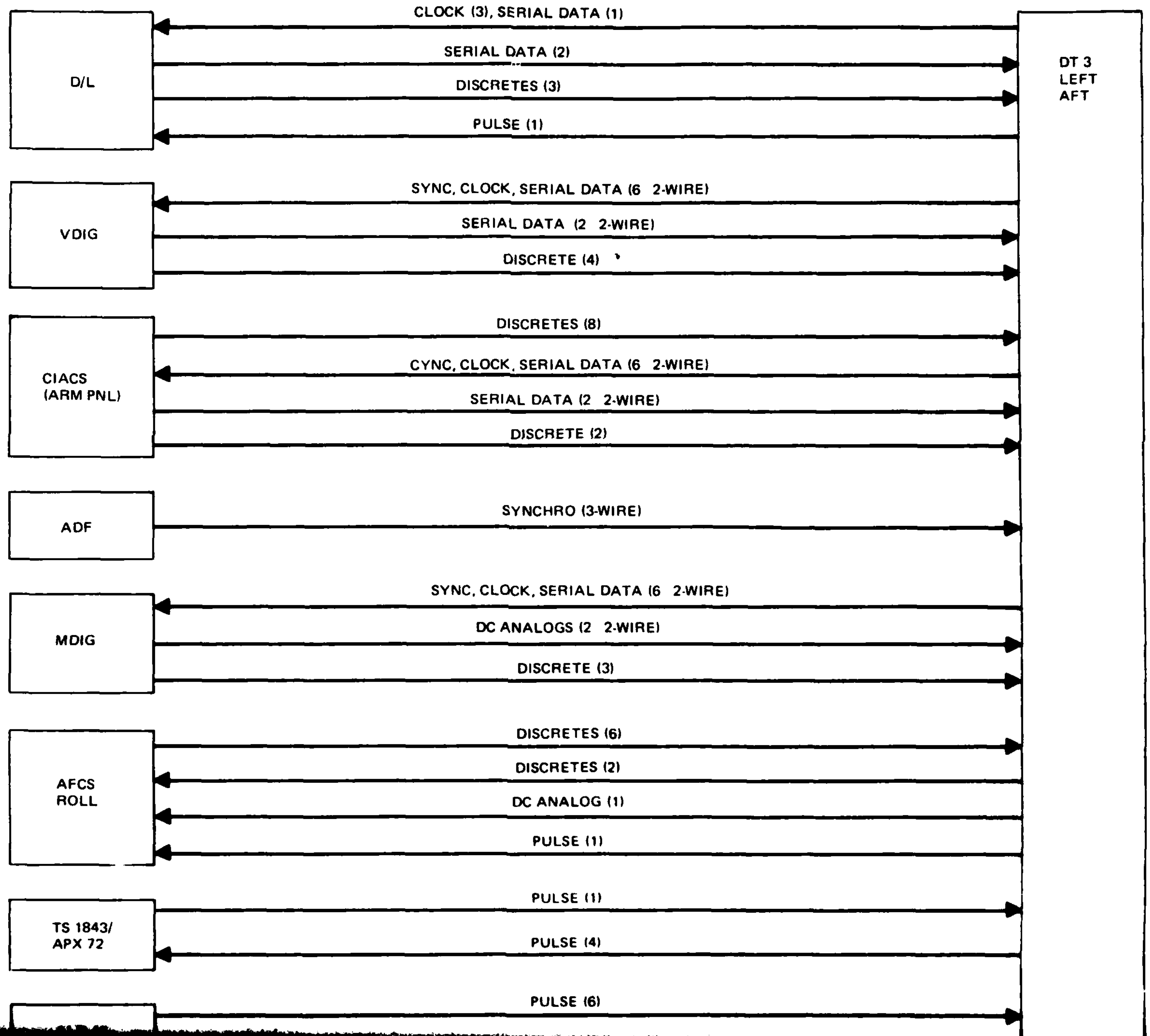

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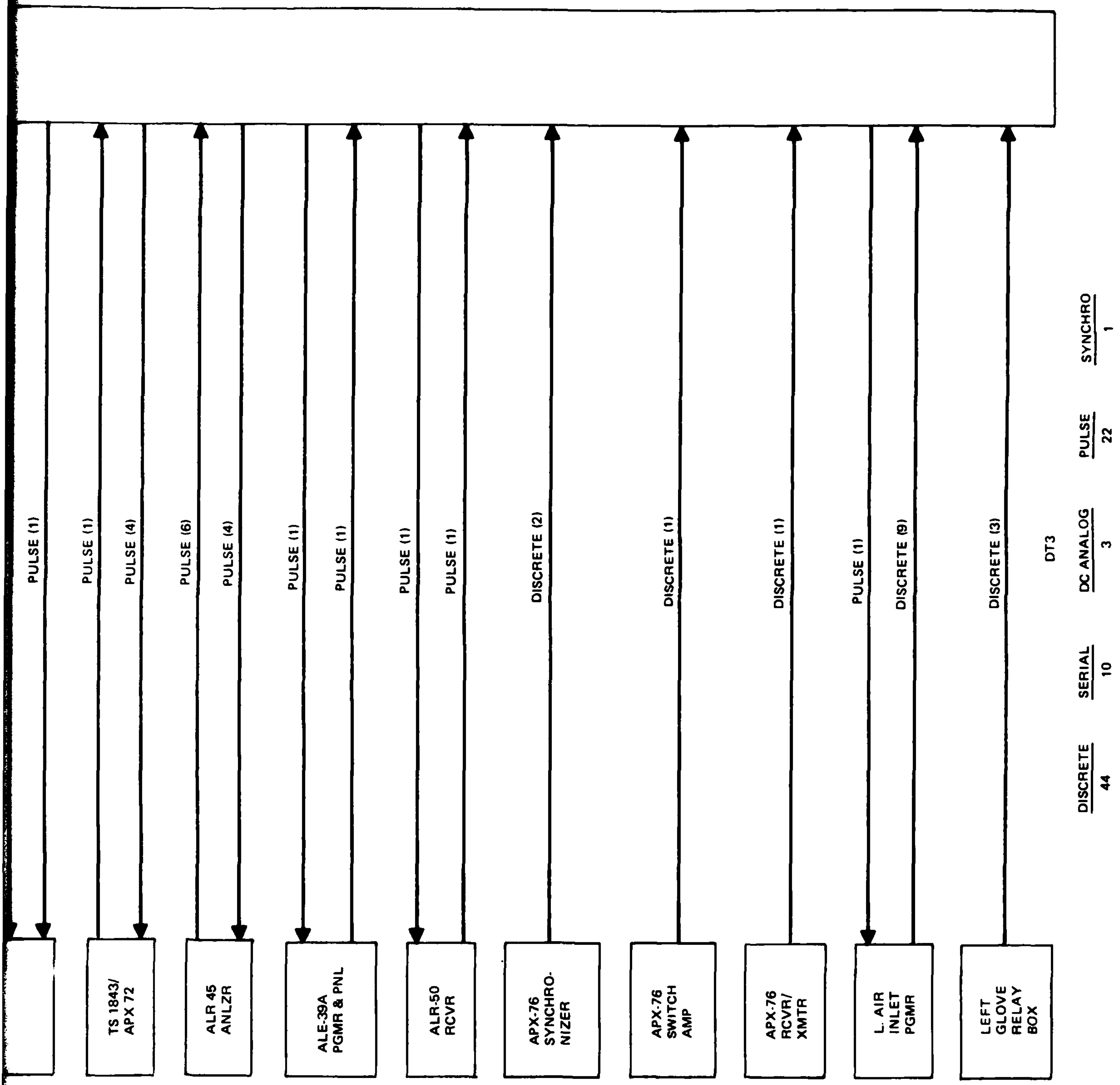

Figure 3-10 DT3 User Electrical Interface

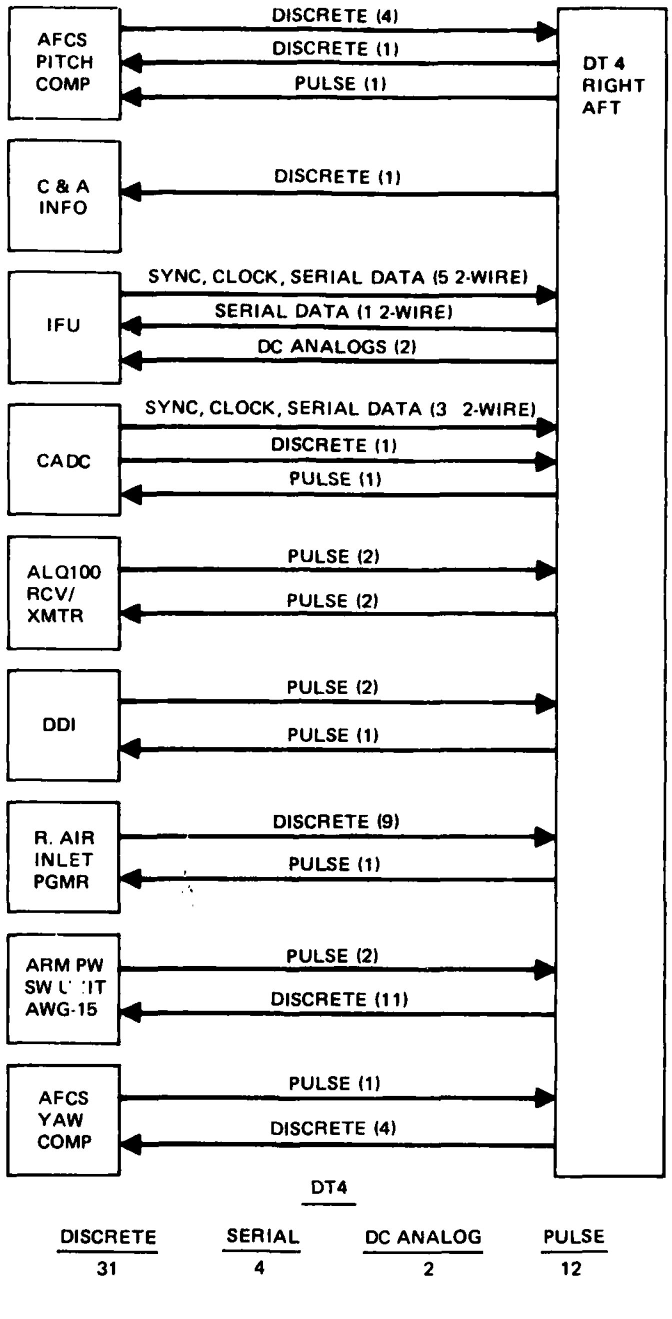

Figure 3-11 DT4 User Electrical Interface

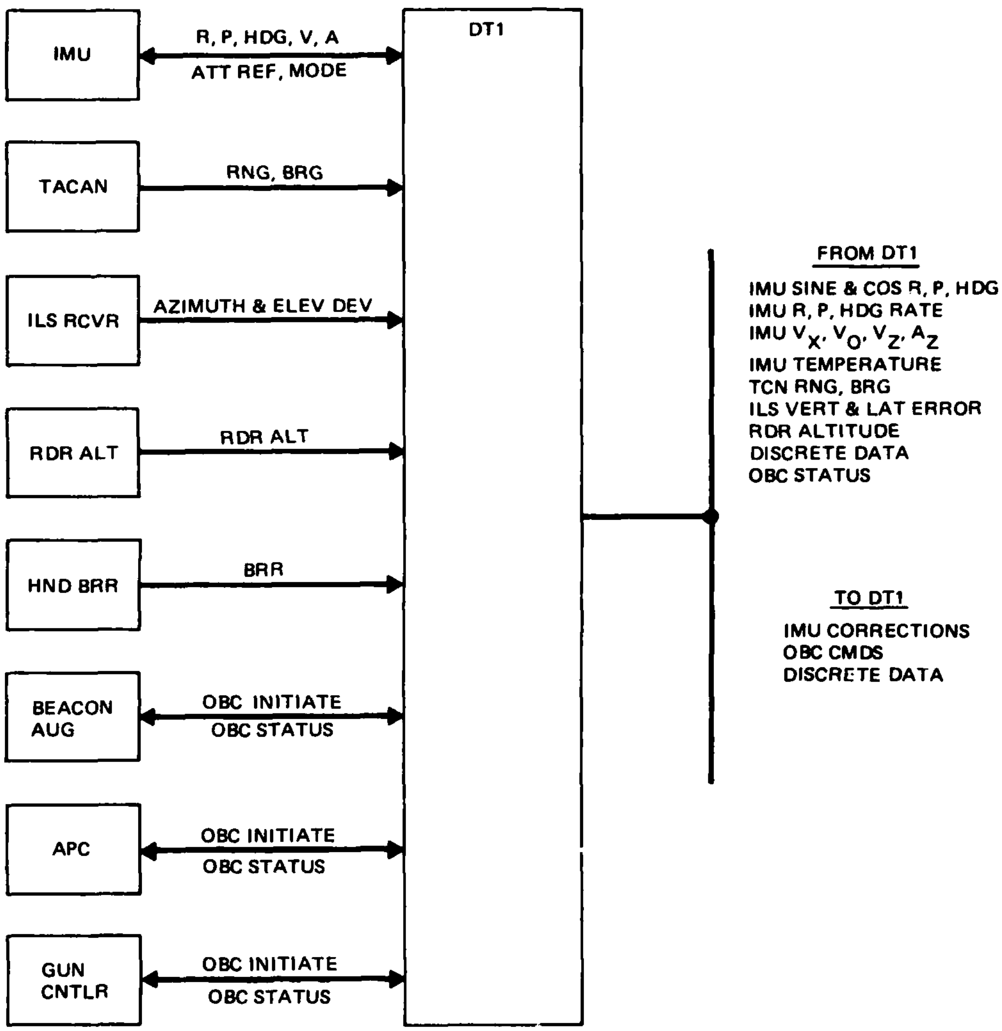

Figure 3-12 DT1 Functional Interface

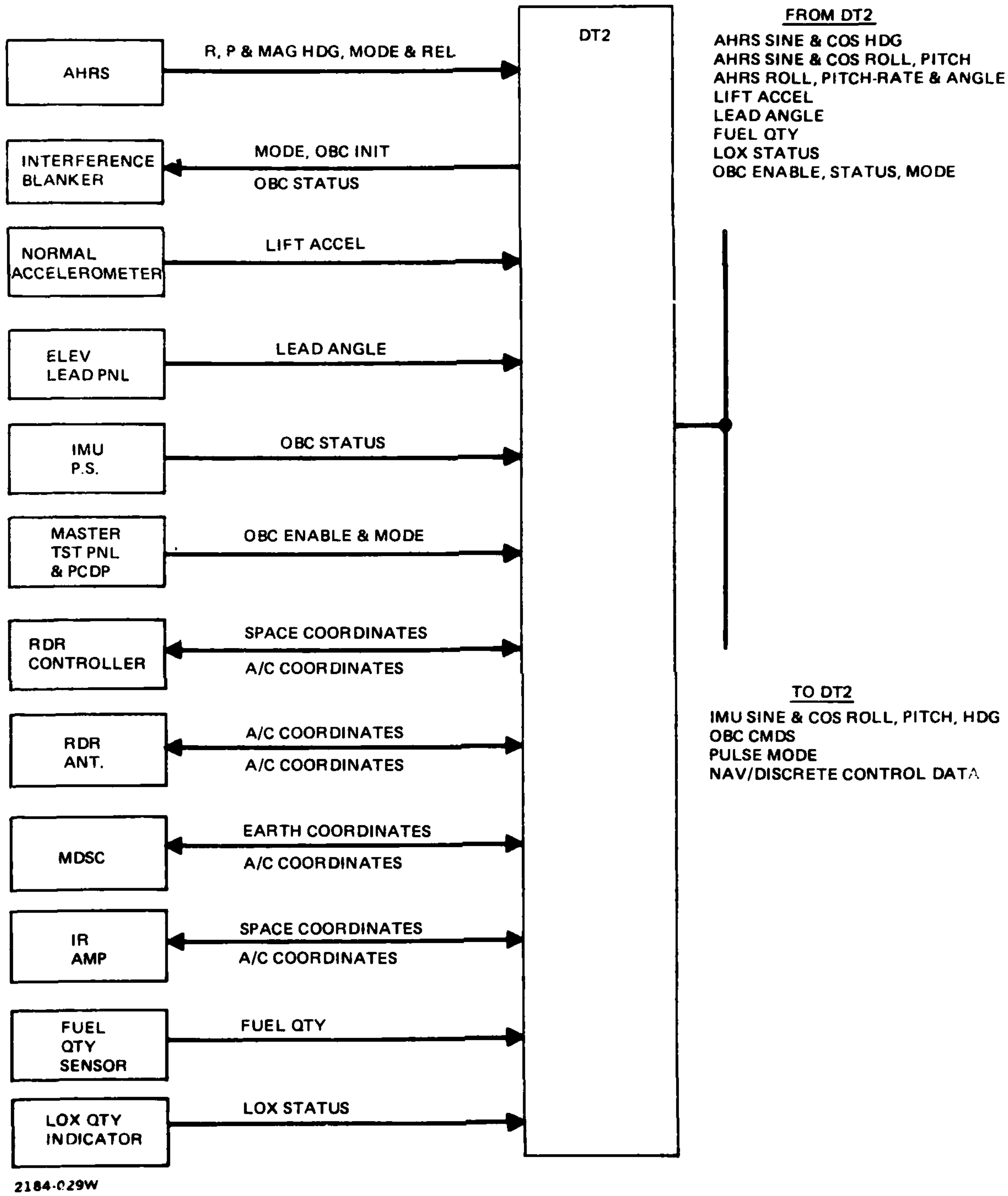

Figure 3-13 DT2 Functional Interface

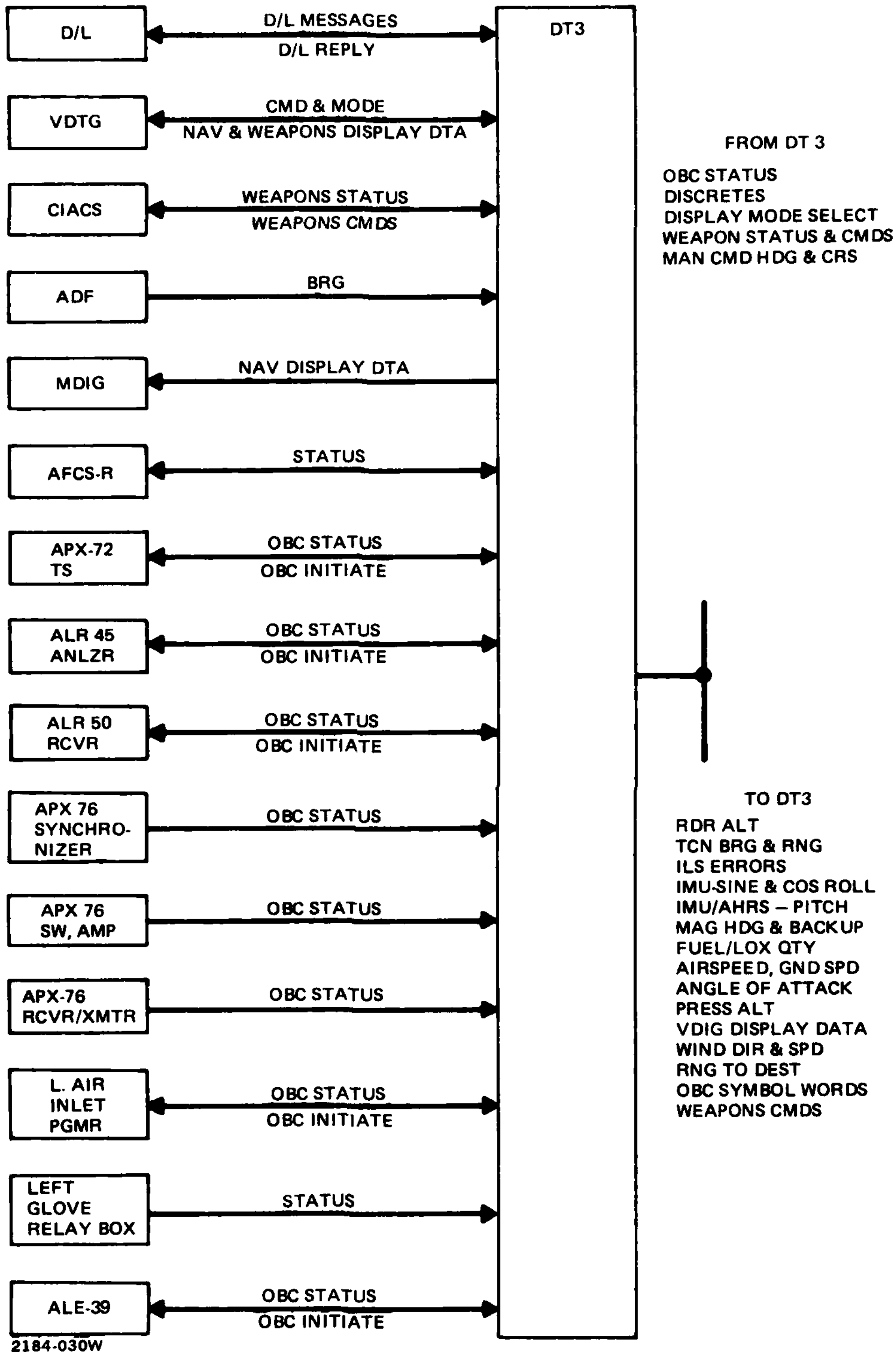

Figure 3-14 DT3 Functional Interface

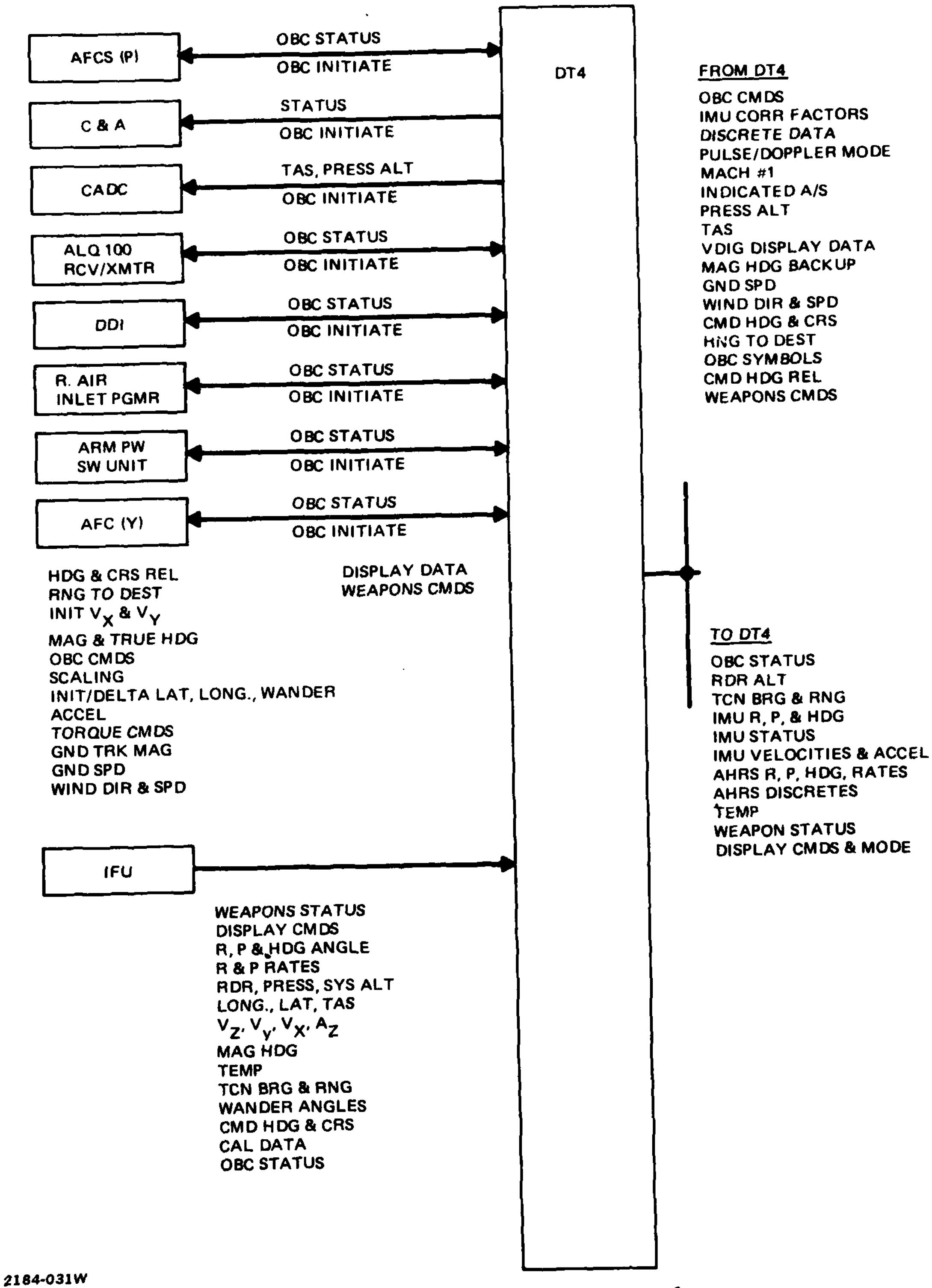

Figure 3-15 DT4 Functional Interface

Table 3-1

Data Terminal Characteristics

	DT 1	DT 2	DT 3	DT4
AVIONIC SIGNAL INTERFACES				
Discretes	23	13	44	31
Serial Digital	3	-	10	4
dc/ac Analog	5	14	4	2
Pulse	17	2	22	12
DATA BUS INTERFACE				
Transmit/Receive Message Groups	6	5	5	10
Data Words (XMIT/RCV)	41	22	52	83
Utilization Time (usec/sec)	62480	52000	32360	82780
ELECTRICAL/MECHANICAL DESIGN				
Major Identified Electrical Parts	85	58	151	107
Volume Required/Alloted (in.^{3})	212.8/320	270.4/320	292.8/320	233.6/320
RAM Indentified/Alloted (Words)	124/1K	91/1K	183/1K1	383/1K
Prom Indentified/Alloted (Words)	2225/4K	1955/4K	1546/4K	1414/4K

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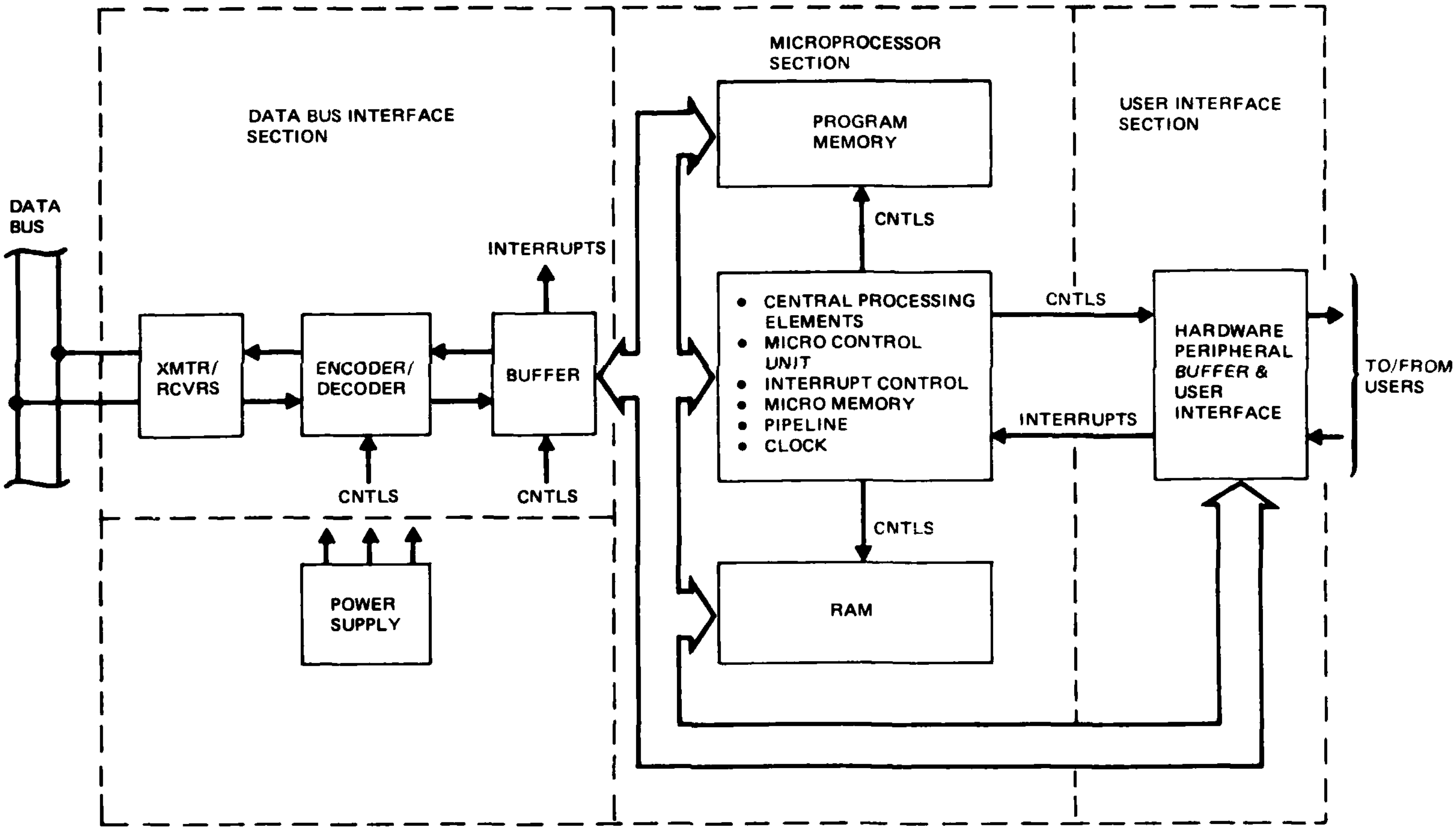

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Figure 3-16 Data Terminal Block Diagram

The data bus interface section provides the transformer coupling, isolation, line driver receiver, and inhibit logic required to insure a compatible data bus electrical interface and transmitter selection. The encoder/decoder provides Manchester/NRZ conversions and associated received data and status signals, while accepting the controls and data for transmission. It is organized to provide independent receive and transmit functions. The buffer is also designed to provide independent transmit and receive paths, and is basically a serial to parallel, and parallel to serial dedicated asynchronous receiver transmitter. It is organized to provide the interrupts, data and status for received information and accept the controls and data for transmitted information. This data bus interface section is designed to operate in conjunction with the 3000 microprocessor elements as well as so called "dumb" terminals. Dumb terminals are data terminals which do not warrant microprocessor capability by virtue of the simplicity of the user interface and the functions it is to perform. The data bus interface controls are implemented in hardware logic.

The microprocessor section is organized to provide the arithmetic, logical, storage, and control functions required by the data bus interface section and the user interface section. For all terminals the data bus protocol programs will be the same while the user programs are unique to the user requirements. This section is organized about a 2 bit slice central processing element and for this application an 8 bit machine (four slices) was selected.

The hardware for these two sections (data bus interface section and microprocessor section) are common to each of the four data terminals. Table 3-2 identifies the required parts, size, and card area required. It should be noted that the parts for a two channel data bus interface section require 26 sq in. of card space and can be easily mounted on a 5.5 in. x 5 in. card. Thus, for future redesigns of avionics requiring a data bus compatible interface, the addition of a single card is the minimum required additional circuitry.

Each of the four data terminals user interface requirements were analyzed based on the signal input/output requirements of Appendices A and B. Figures 3-17 through 3-20 are block diagrams of the user interface for DT1, DT2, DT3 and DT4, respectively. Using these figures, an estimate of the required circuitry was performed. The resulting estimated user parts requirements are tabulated in Tables 3-3 through 3-6. Based on the parts count for each data terminal, a physical size was

Table 3-2 Data Bus Interface and Micro Processer Parts Estimate (Common to All Data Terminals)

PART FUNCTION	QUANTITY	SOURCE/TYPE/CONTROL NO.	SIZE	* AREA, $in.^2$
XMTR/RCVR	2	SM-A-914991	1.5 in. x 1.5 in. Hybrid	3
XMIT Inhibit Control	--	--	2-16 Pin Dips	2
XFMRS	2	GAC-P42	.75 in. x .5 in x .5 in Module	1
Encoder/Decoder	2	SM-A-915019	40 Pin Dip	10
Buffer	2	SM-A-914983	40 Pin Dip	10
Micro-Control Unit	1	3001	40 Pin Dip	5
Interrupt Control Unit	1	3214	24 Pin Dip	3.25
Micro Memory Prom	4	82S114 (256 x 8 ea)	24 Pin Dip	13
Pipeline Registers	3	54LS114	24 Pin Dip	9.75
XTAL Clock	1	MF5406	.8 in. x .5 in. x .3 in. Module	1
Counters	1 ea	54S196 & 93S05	14 Pin Dips	2
CPE	4	3002 (x 2)	28 Pin Dips	14
RAM	4	93L422 (256 x 4 ea)	24 Pin Dips	13
Address Extension	1 ea	54273 & 54138	20 & 16 Pin Dips	3.5
Main Memory (PROM)	4	82S191 (2K x 8 ea)	24 Pin Dips	13.0
Power Supply	1	GAC No. TBD	4 in. x 4 in. x 2 in. Module	

*NOTE: Card area required is based on the following alloted area per dip:

14 & 16 Pin Dips = 1 $in.^2$
20 Pin Dips = 2.5 $in.^2$
14 Pin Dips = 3.25 $in.^2$
28 Pin Dips = 3.25 $in.^2$
40 Pin Dips = 5.0 $in.^2$

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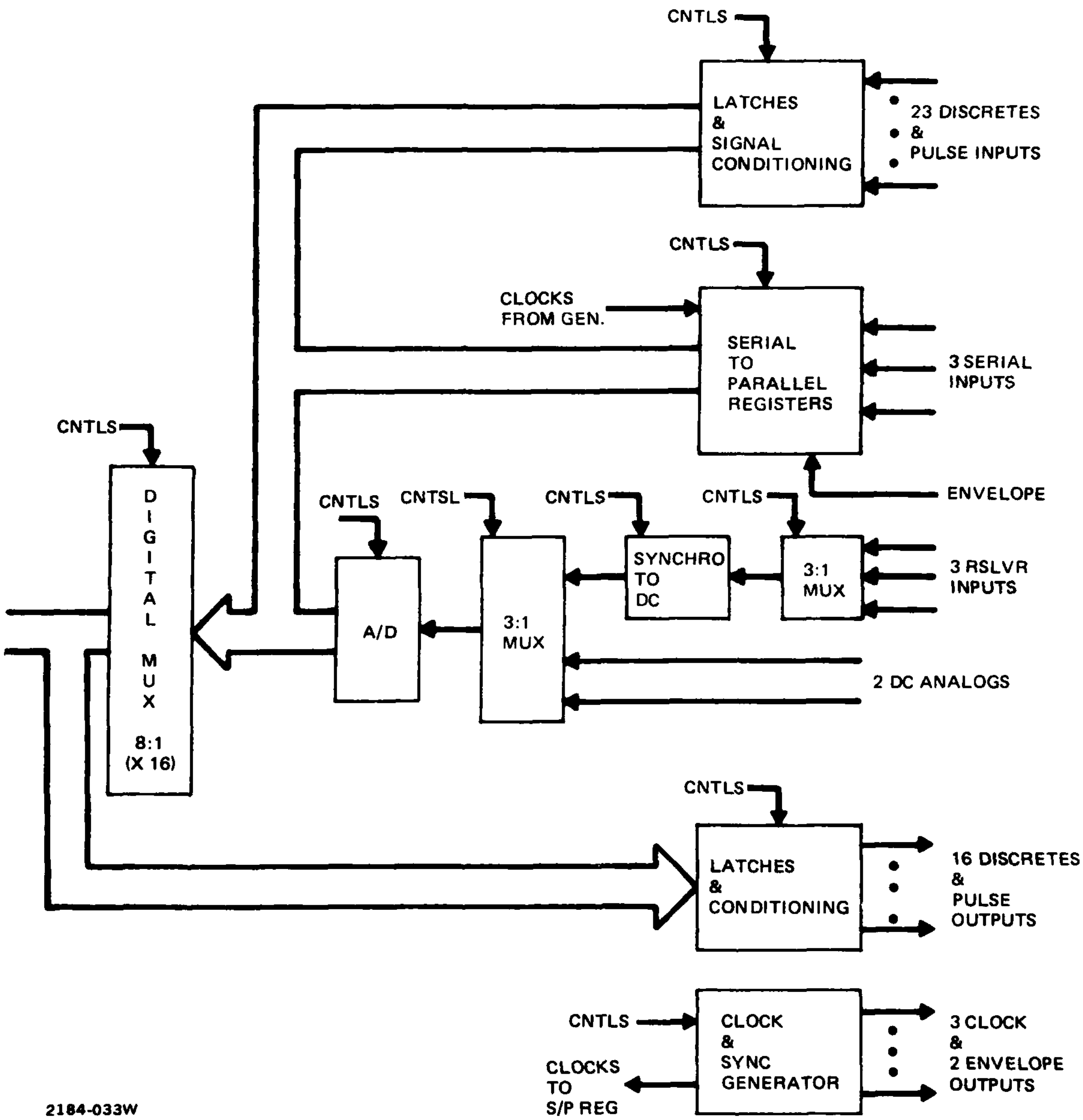

Figure 3-17 DT1 User Interface

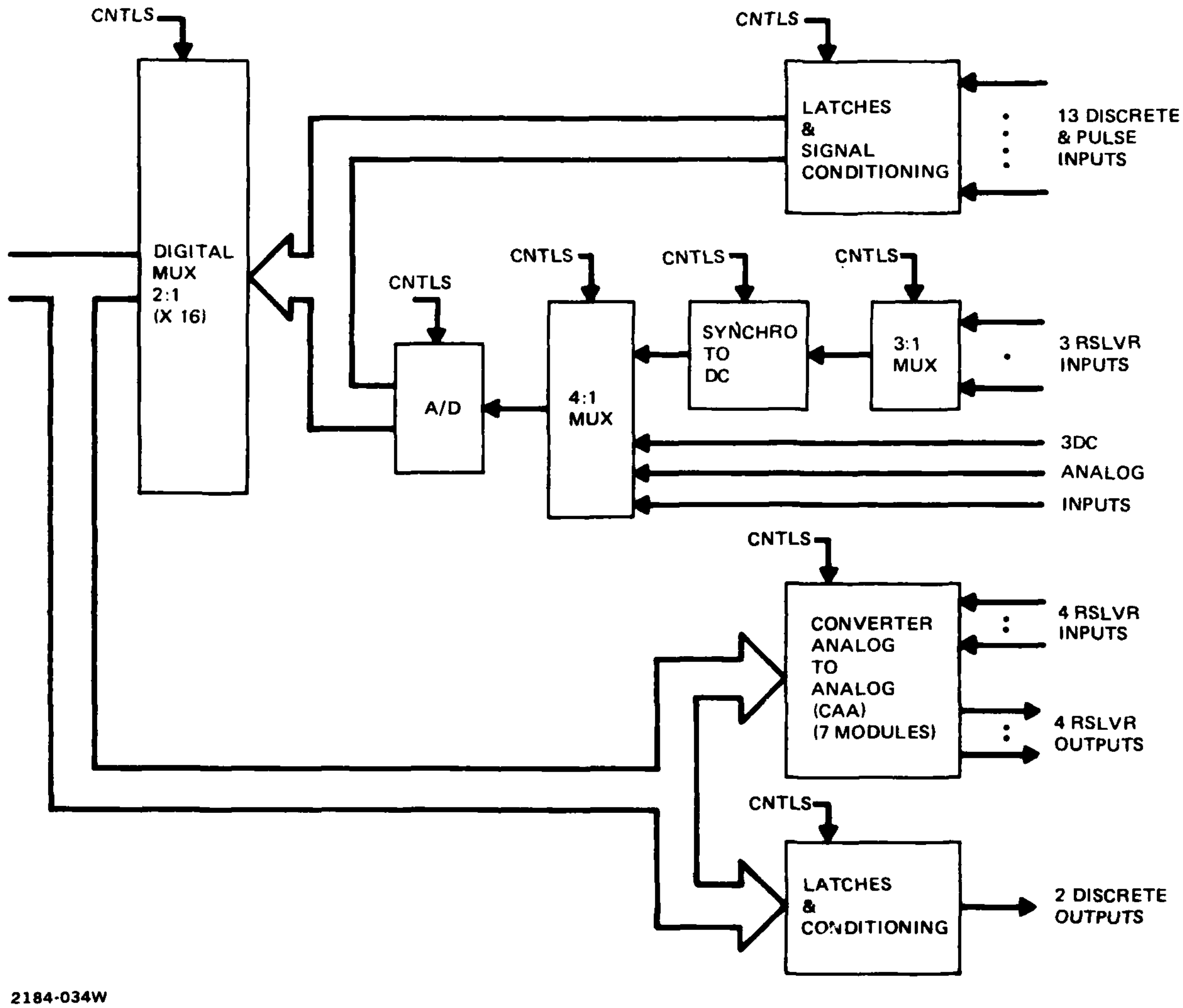

Figure 3-18 DT2 User Interface

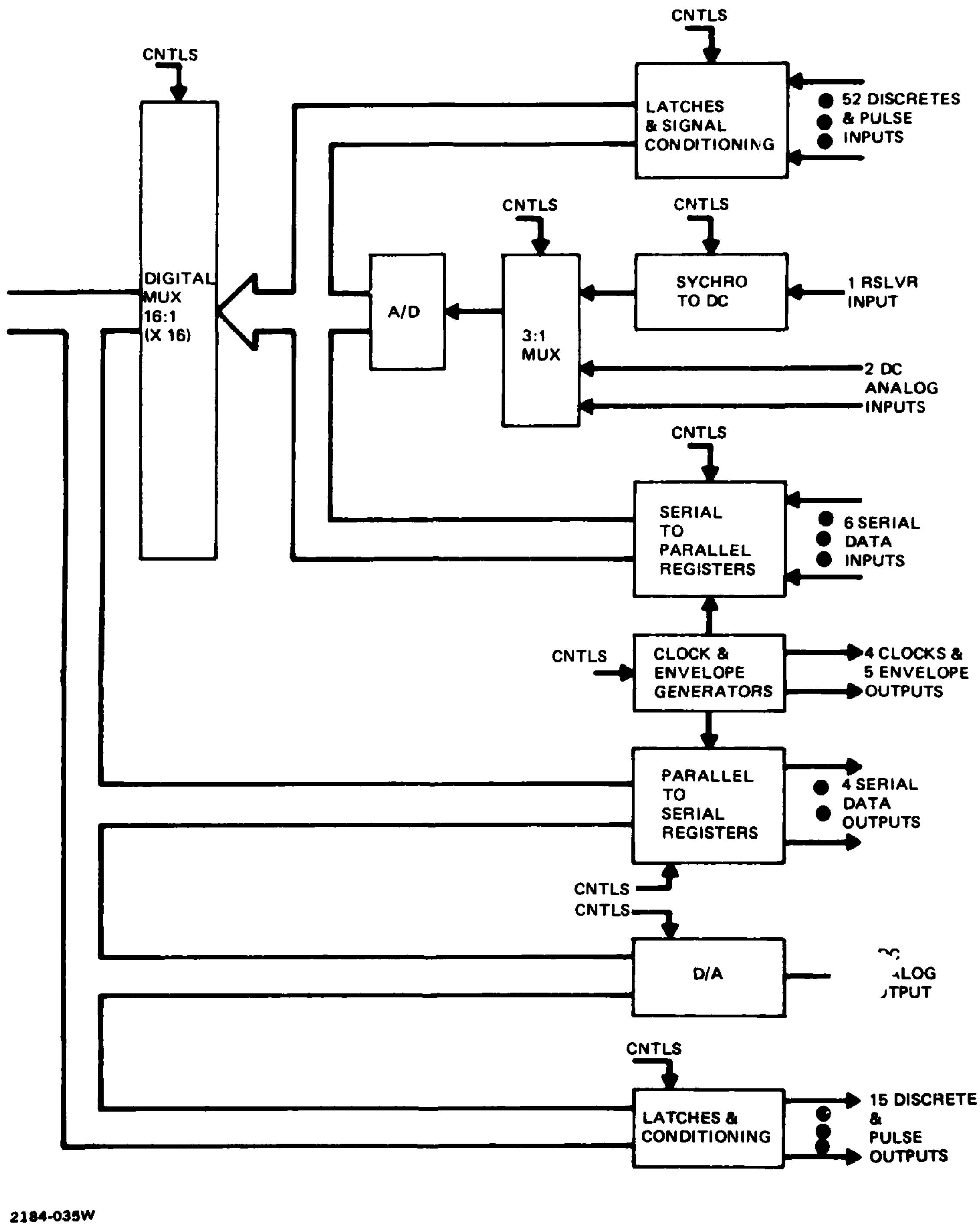

Figure 3-19 DT3 User Interface

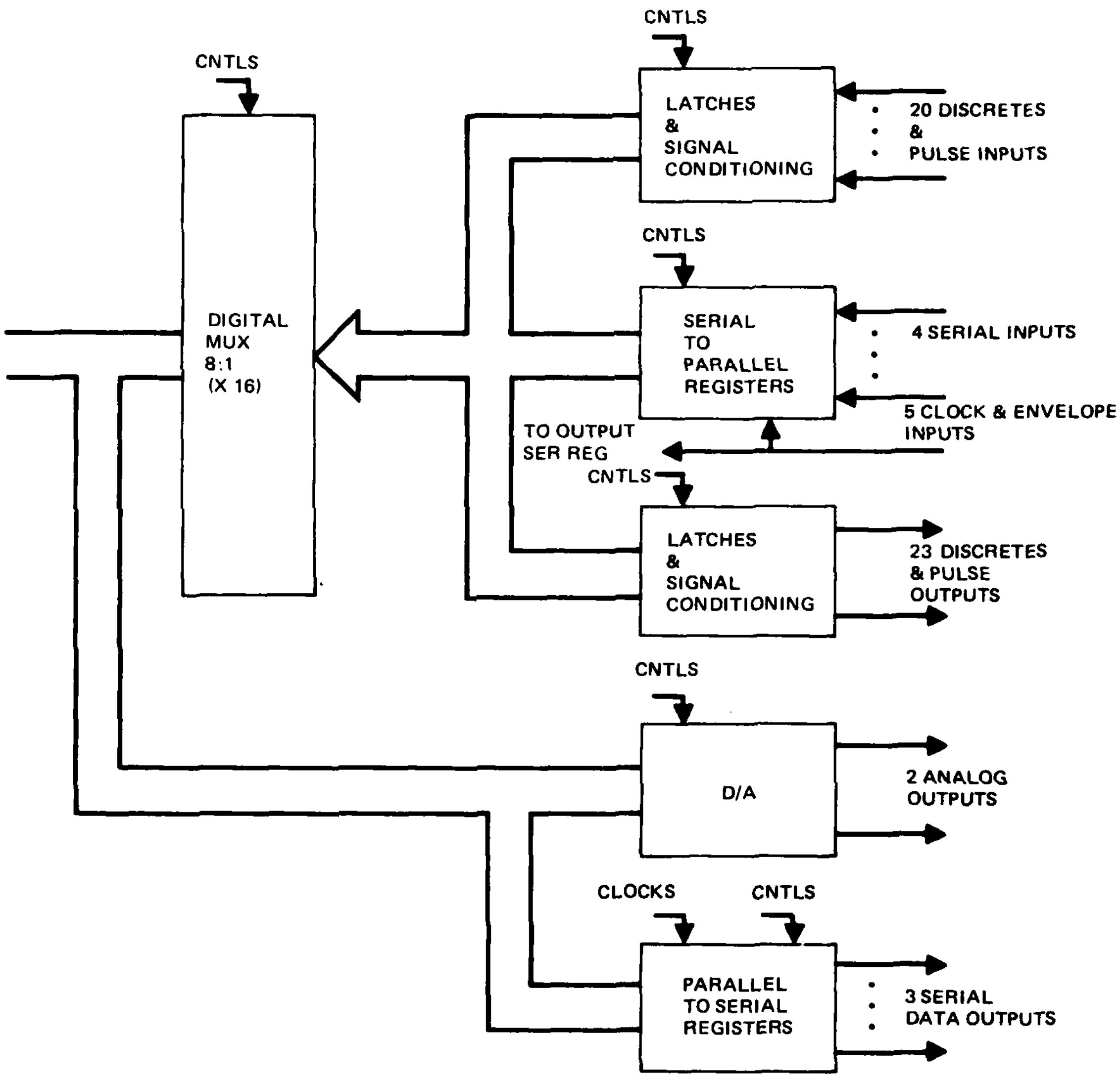

Figure 3-20 DT4 User Interface

Table 3-3 Data Terminal 1 (DT1) User Parts Estimate

FUNCTION	SOURCE/TYPE	EQUIVALENT SIZE	AREA, $in.^2$
Input Discretes & Pulse	Conditioning & Latches (Quad -4)	8-16 Pin Dips	8
SER Input Registers	SER/PAR 8 Bit (74164)	12-16 Pin Dips	12
3:1 MUX (RSLVR)	4 x SPST	3-14 Pin Dips	3
Synchro to dc	SLDC-L-1	3.1 in. x 2.6 in. x .82 in. Module	9
3:1 MUX (dc Analog)	4 x SPST	1-14 Pin Dips	1
A/D	DAC395	2 in. x 2 in. x 0.4 in. Module	4
Output Discretes & Pulse	Conditioning & Latches (Quad-4)	6-16 Pin Dips	6
Clock & Envelope Generators	Counters, Latches (Quad-4) & Conditioning	4-16 Pin Dips	4
Digital MUX	3-S, 8 to 1 x 16, SN54151	16-16 Pin Dips	16
		TOTAL	63

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Table 3-4 Data Terminal 2 (DT2) User Parts Estimate

FUNCTION	SOURCE/TYPE	EQUIVALENT SIZE	AREA, $in.^2$
Input Discretes & Pulse	Conditioning & Latches (Quad-4)	4-16 Pin Dips	4
3:1 MUX (RSLVR)	4 x SPST	3-14 Pin Dips	3
Synchro to dc	SLDC-L-1	1-3.1 in. x 2.6 in. x .82 in. Module	9
4:1 MUX (dc)	4 x SPST	1-14 Pin Dips	1
A/D	DAC 395	1-2 in. x 2 in. x 0.4 in. Module	4
Digital MUX	3-S, 2 to 1 (x 16) SN54151	4-16 Pin Dips	4
CAA	CSDC Modules	7-7 in. x 2 in. x ½ in. Modules	(49 $in.^3$ total vol.)
Output Analog	N-DAC-10	1-2.6 in. x 3.1 in. x 0.6 in. Module	8
Output Discretes	Conditioning & Latches (Quad-4)	1-16 Pin Dips	1
		TOTAL	34

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Table 3-5 Data Terminal 3 (DT3) User Parts Estimate

FUNCTION	SOURCE/TYPE	EQUIVALENT SIZE	AREA, $in.^2$
Input Discretes & Pulses	Conditioning & Latches (Quad-4)	26-16 Pin Dips	26
Synchro to dc	SLDC-L-1	1-3.1 in. x 2.6 in. x .82 in. Module	9
3:1 MUX (Analog)	4 x SPST	1-14 Pin Dips	1
A/D	DAC 395	1-2 in. x 2 in. x 0.4 in. Module	4
Serial Input Data	SER/PAR-8 Bit (74164)	24-16 Pin Dips	24
Clock & Envelope	Counters, Latches	6-16 Pin Dips	6
Serial Output Data	PAR/SER-8 Bit (54165)	16-16 Pin Dips	16
D/A	N-DAC-10	1-2.6 in. x 3.1 in. x 0.6 in. Module	9
Output Discretes & Pulse	Conditioning & Latches	8-16 Pin Dips	8
Digital MUX	3-S, 16:1 (x 16) 54151	32-16 Pin Dips	32
		TOTAL	135

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Table 3-6 Data Terminal 4 (DT4) User Parts Estimate

FUNCTION	SOURCE/TYPE	EQUIVALENT SIZE	AREA, $in.^2$
Input Discretes & Pulse	Conditioning & Latches (Quad 4)	10-16 Pin Dips	10
Serial Input Data	SER/PAR 8 Bit (74164)	16-16 Pin Dips	16
Output Discretes & Pulse	Conditioning & Latches (Quad 4)	16-16 Pin Dips	16
Output Analogs	N-DAC-10	2-2.6 in. x 3.1 in. x 0.6 in. Modules	18
Output Serial Data	PAR/SER 54165	12-16 Pin Dips	12
Digital MUX	3-S, 8 to 1 x 16, 54151	16-16 Pin Dips	16
		TOTAL	88

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determined for the units. The approach and results are tabulated in Table 3-7. These unit envelope volumes are consistent with the 320 cu in. (4 in. x 8 in. x 10 in. box) allotted for each data terminal for installation on the aircraft.

3.4.2 Data Terminal Functional Flow

A general flow diagram for the data terminals is illustrated in Figure 3-21. The basic concept is oriented about the five major functions that each of the data terminals require. These programs are identified as initialize, built-in-test, service user interface, service terminal computations, and service data bus. Interrupts associated with the data bus, user interface circuitry, and functions are provided to insure servicing requirements on a priority basis.

The initialize routine is executed each time power is applied to the unit, after a power interruption or after program watchdog timers have indicated excessive loop counts in a program. This routine clears the interrupts, presets internal flags, presets or clears user and data RAM files, and initializes the user and data bus interface circuitry. The built-in-test routine follows the initialize routine on power turn on, however, portions of this routine are entered whenever the terminal has satisfied operational functions and does not have interrupts being serviced or in the interrupt control unit. This routine includes such functions as memory check-sum tests, A/D and D/A tests, user interface loop checks, simulated user limit computations, stack status checks, and interrupt watchdog timer checks. The user service must be accomplished by reading and writing information from the user RAM files into the user interface hardware. Typical functions required are loading the discrete interface latches, reading discrete inputs, parallel loading of serial output user registers, reading out serial input registers, reading out digitally encoded analog data, loading D/A modules, updating converter analog to analog digital modifiers and initiating and modifying pulse train information. The terminal computations are those logical or arithmetic functions which have been assigned to each terminal. They are generally assigned as a function associated with a user of the terminal, but may be associated with a convenient or redundant location to perform an arithmetic function that is utilized by other terminals as well. Typically, these functions are mode control (i.e., IMU or AHRS navigation functions, OBC class interlocks), reformatting information for compatibility with users and data bus, computations (i.e., commanded airspeed error, true angle of attack, relative TACAN bearing/range). The data bus interface functions are

Table 3-7 DT Volumes Required

FUNCTION	PARTS AREA, $in.^2$	NO. CARDS	VOLUME, $in.^3$
Bus Interface & Processor	103.5	5	63
Power Supply	----	4 in. x 4 in. x 2 in. Module	32
		SUBTOTAL	95
DT1 User Interface	63	3	38
DT2 User Interface	34	2	25
DT2 CAA Modules	---	--	49
		SUBTOTAL	74
DT3 User Interface	135	7	88
DT4 User Interface	88	4	51
DT1 Minimum Envleope			(95 + 38) x 1.6 = 212.8
DT2 Minimum Envelope			(95 + 74) x 1.6 = 270.4
DT3 Minimum Envelope			(95 + 88) x 1.6 = 292.8
DT4 Minimum Envelope			(95 + 51) x 1.6 = 233.6

NOTES:
1. Card Size = 3 in. x 7 in., Card Spacing = .6 in.
2. Number of Cards = Parts Area ÷ Card Size
3. Volume = Card Size x Spacing x Number of Cards
4. Minimum Envelope (Box Size) = Electronics Volume x 1.6 (Mechanical Components Factor)

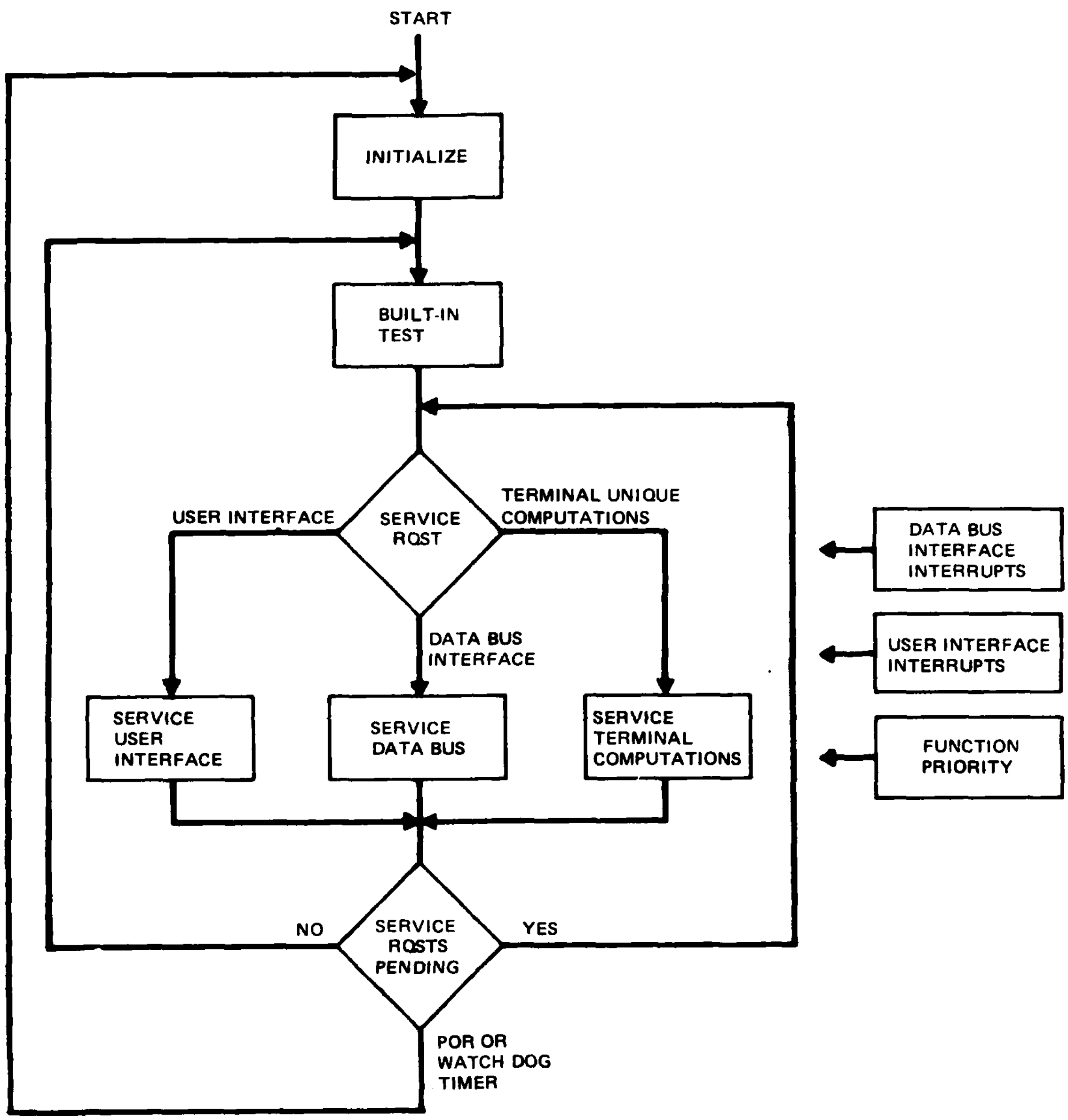

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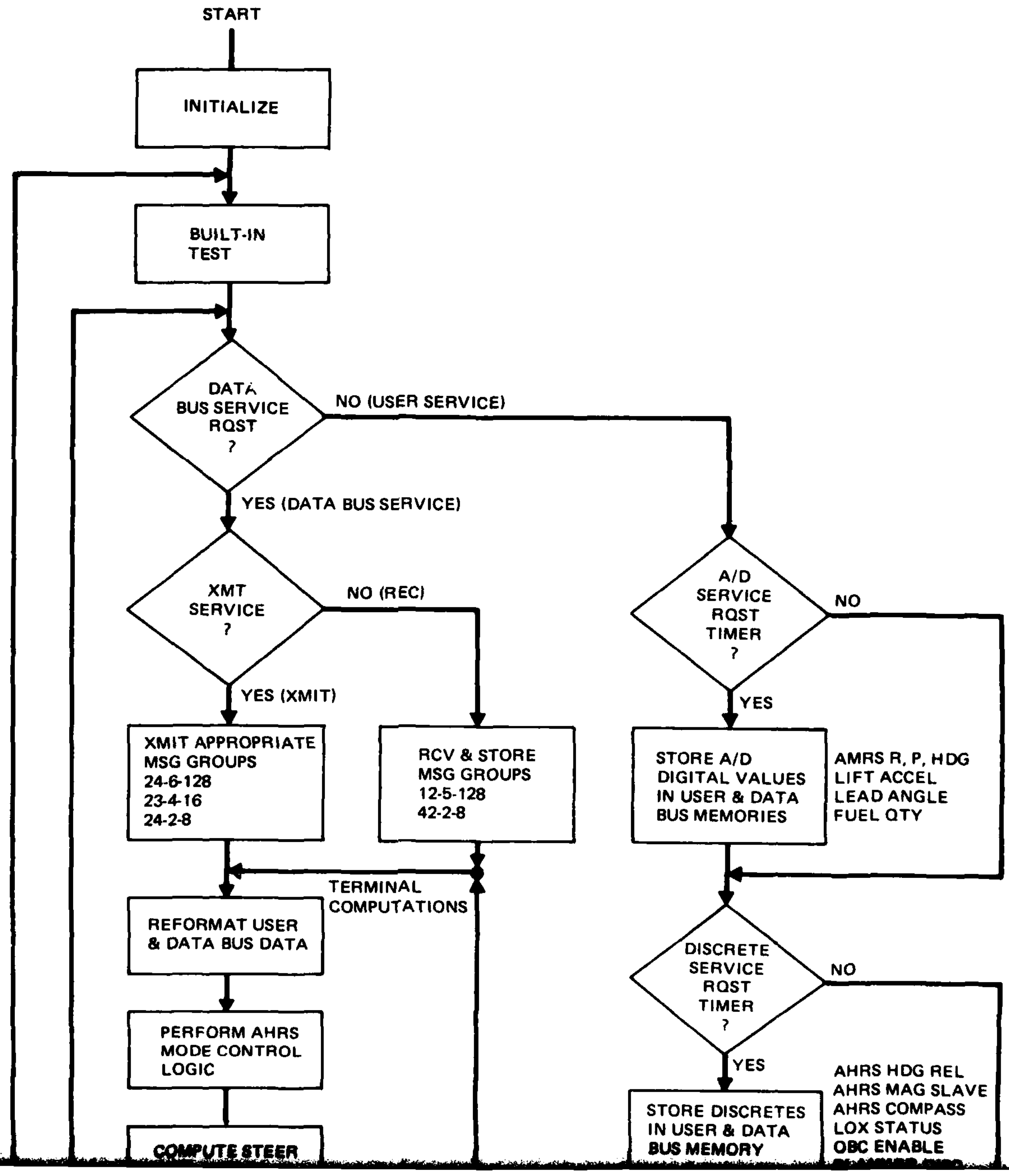
Figure 3-21 General Data Terminal Functional Flow associated with servicing the requirement of this interface. The program must respond to transmit, receive and offer commands, transfer data to and from the data bus RAM files, and generate commands and/or data when information is required to be transmitted or received from other terminals. Thus, this program must be capable of operating in command/response or polling modes and as either bus controllers or remotes with echo checks of its own transmissions. A flow diagram for DT2 is illustrated in Figure 3-22 with annotations relating the identified user, data bus and computational functions identified for this terminal.

In order to provide an insight into the program memory requirements, the CSDC program elements were reviewed and assigned to each of the data terminals according to the user interface, self test and computation requirements (Table 3-8). This approach is considered conservative and is basically a confirmation that the 4K main program memory size selected is adequate. In addition, based on experience in programming, the 3000 and its application with data bus systems, the initialization and data bus routines are expected to require $\frac{1}{4}$K and $\frac{1}{2}$K, respectively. The total program memory is expected to be distributed as follows:

Initialization	$\frac{1}{4}$ K
Built-in-Test	$\frac{1}{4}$ K
Data Bus Service	$\frac{1}{2}$ K
User Service & Computations	2 K
Scratch Pad & Growth	1 K
	4 K Total

The amount of random access memory required for each of the data terminals is based upon organizing the memories into two separate files of 8 bit words. A user file which will service the user input/output data requirements and a data bus file which will service the data bus interface input/output requirements. This approach results in some duplication of data in each file, but this is not considered significant for this preliminary analysis.

The user RAM requirements is based upon analysis of each data terminal user interface using the baseline information of Appendices A and B. Table 3-9 is an itemized listing of the RAM requirements for each data terminal. The RAM required



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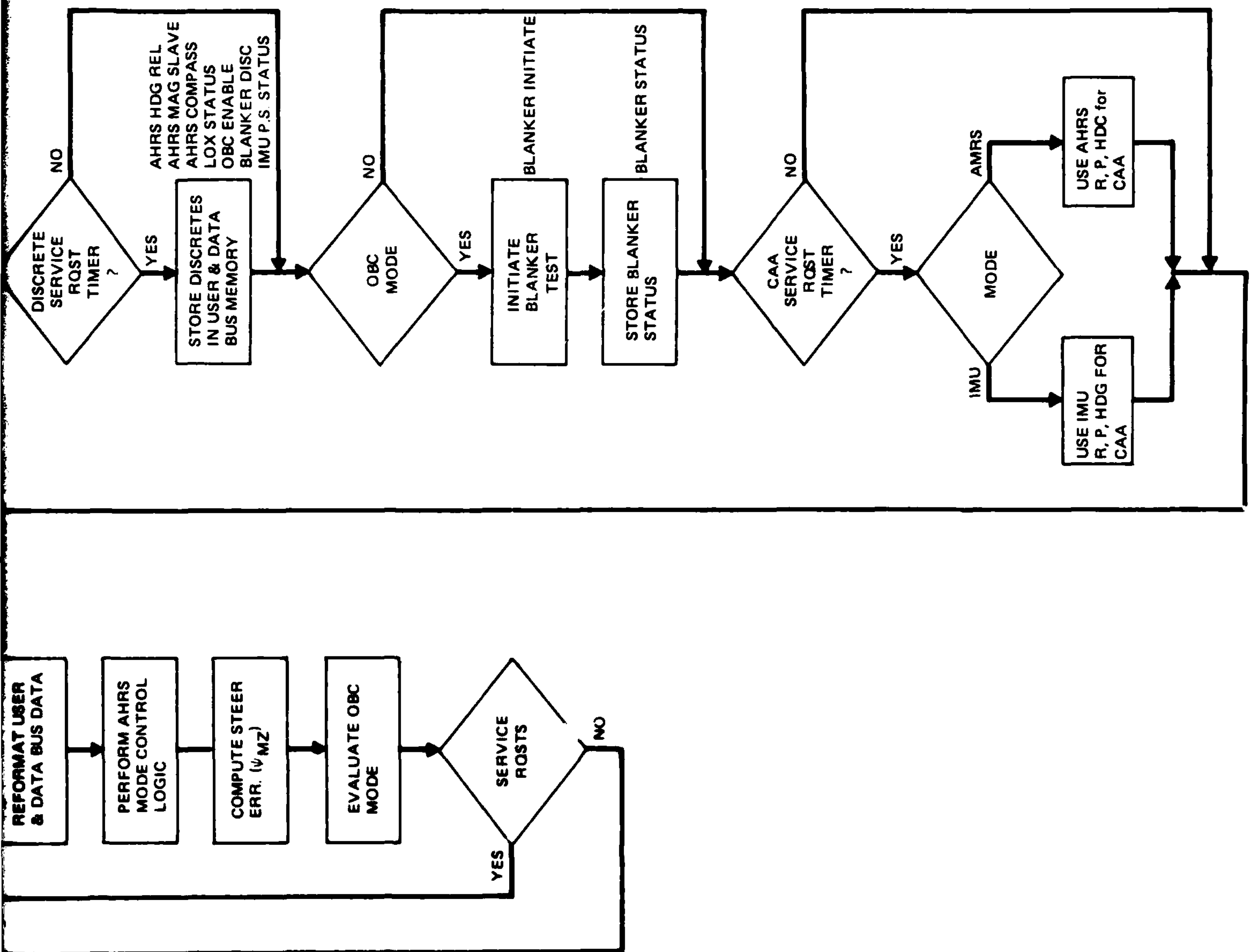


Figure 3-22 DT2 Functional Flow

Table 3-8

Data Terminal User Program and Computation Elements

PROGRAM DESCRIPTION	NO. WORDS	DT APPLICABILITY
OBC ALE-39 Testing	60	3
Flycatcher Routine	12	4
Command BIT Testing Routine	82	1 2 3 4
Angle of Attack Bias Routine	50	4
OBC Command Routine	31	1 2 3 4
NDRO SIN/COS Tables	1024	1 2
Interrupt Disable Routine	6	1 2 3 4
SINE/COSINE Subroutine	26	1 2
ARCTAN Subroutine	57	1 2
"A" MATRIX Elements	54	4
AWG-9 Input Data Routine	19	4
AWG-9 Output Data Routine	12	4
Rescale SIN/COS	8	1 2
VDIG/MDIG Output Routine	22	3
Initialize A/O MUX, BIT & WOW	22	1 2 3 4
OBC CMD BIT Termination	10	1 2 3 4
OBC Clear/Post Fail BITS Routine	5	1 2 3 4
Gyro Torque Output	38	1
MUX Input	55	1 2 3 4
Velocity Output to AWG-9	22	4
NAV Data Output to AWG-9	12	4
Rate Computations	78	1 2
IMU CAL Data Routine	16	1
D/L Request Routine	20	3
D/L Output Routine	47	3
D/L Mode Check	12	3
D/L Test Output	15	3
D/L Processing	83	3
VDIG Pitch & Command Speed	10	3

Table 3-8 Data Terminal User Program and Computation Elements (Cont.)

PROGRAM DESCRIPTION	NO. WORDS	DT APPLICABILITY
TACAN Input & Output	21	1
VDIG Roll Output	18	3
Radar Altimeter Input	2	1
Compute Platform Heading	24	1 2
ALE-29A OBC Routine	22	3
Vertical Accel. Computation	8	1
Update Mode Routine	38	4
System Altitude Computation	16	4
Fixed Earth Torquing	35	1
"A" MATRIX Update	39	4
Velocity Correction Terms	39	1
Gyro Torquing Computation	32	1
Wander Angle Computation	11	4
Latitude Computation	12	4
Longitude Computation	6	4
Select IMU/AHRS for Roll & Pitch	38	4
Update Align BITS	21	1
Comp Valid/Select True Heading	27	1 4
Smooth Magnetic Variation	16	2
Select Mag. Heading Source	14	4
D/L Command Errors	39	3
VDIG (CMD A/S Error/ILS Vert Error)	23	3
MDIG (Magnetic Heading)	4	3
VDIG (ILS Lateral Error)	9	3
MDIG (Ground Speed)	6	3
VDIG (TTG/Reticle, Man Elev)	8	3
MDIG (Wind Dir/Wind Speed)	4	3
VDIG (Vert. GSE)	4	3
MDIG (DSM CMD Hdg (Rel)/CMD CRS (REL)	4	3
VDIG (PRES ALT-C/RDR Alt)	17	3
MDIG (Range to Dest)	4	3

Table 3-8 Data Terminal User Program and Computation Elements (Cont.)

PROGRAM DESCRIPTION	NO. WORDS	DT APPLICABILITY
VDIG (CMD Alt Error)	6	3
MDIG (True A/S B)	4	3
VDIG (Lateral GSE)	4	3
MDIG (OBC Symbol Word)	4	3
VDIG (MAG Hdg/CMD Alt)	5	3
Pressure Alt. Rate/Airspeed A	16	4
Airstream Temp/MACH #2	6	4
Angle of Attack	6	4
Lift Acceleration	3	4
MAG Heading/Manual CMD Heading & Course	13	3
TACAN Bearing Computation	16	1
VDIG (Command Heading)	4	3
MDIG (TACAN Range & Bearing)	8	3
VDIG (ALT Rate 2)	5	3
MDIG (ADF Bearing & TACAN Dev)	19	3
VDIG (Angle of Attack & TACAN Dev)	17	3
AFCS Valid & VDIG Display Valid	74	3
Steering Error Reliable	25	3
VDIG (DISCR Data WD to VDIG)	22	3
AWG-9 Discrete Data Word	74	4
OBC Processing	55	1 2 3 4
ALE-29/39A Processing	69	3
APR-45/50 Processing	51	3
TACAN OBC Processing	18	1
D/L OBC Processing	20	3
APX-76 Servicing	44	3
WRA Fail Encoding	50	1 2 3 4
Scratch Pad Test	10	1 2 3 4
Instruction Test	62	1 2 3 4
Memory Checksum Test	6	1 2 3 4
Serial Word Test	24	1 2 3 4
Discrete MUX	20	1 2 3 4

Table 3-8 Data Terminal User Program and Computation Elements (Cont.)

PROGRAM DESCRIPTION	NO. WORDS	DT APPLICABILITY
Output & Power Supply Test	22	1 2 3 4
A/D & D/A Test	58	1 2 3 4
Update Fail BITS	23	1 2 3 4
Packed Discrete Control Words	19	1 2 3 4
Discrete Encoder Table	12	1 2 3 4
Inertial NAV Constants	23	1
Indexed Constants - Various	41	1 2 3 4
Converter Constants (A/D & D/A)	11	1 2 3 4
Rate Comp Constants	7	1 2
Various Constants	91	1 2 3 5

SUMMARY			
DT 1	DT 2	DT 3	DT 4
2225	1955	1546	1414

Table 3-9 User RAM Requirements

DT 1		
ITEM *	FUNCTION	RAM (WORDS)
84	TCN RNG	2
85	TCN BRG	2
86	RDR ALT	2
110	IMU CAL Data	3
120	IMU Temp Mon	2
131-136	Gyro Torq	8
142	Roll Angle	2
143	Pitch Angle	2
144	HDG-X1	2
145	HDG-X8	2
146-148	ΔV_x, ΔV_y, ΔV_z	9
188	Azimuth Dev	1
190	Elev. Dev.	1
--	Discretes & OBC	4
		42

DT 2		
ITEM*	FUNCTION	RAM (WORDS)
157	Roll Synchro	3
158	Pitch Synchro	3
159	MAG HDG Synchro	3
199-204	Coord Transforms	36
---	Discretes & OBC	2
		47

Table 3-9 User RAM Requirement (Cont.)

DT 3		
ITEM	FUNCTION	RAM (WORDS)
22	ADF BRG	2
31	SIP 0600	2
32	SIP 0700	3
33	SIP 0701	2
90	MDIG CMD HDG & CRS REL	3
91	RNG TO DEST	2
92	TAS-B	2
93	TCN Dev & ADT BRG	3
94	REL TCN BRG & RNG	3
95	OBC Symbol Word	3
96	CMD A/S & ILS Vert Error	2
97	ILS Lat Error	1
98	TTG & Ret Man Elev	2
99	TCN Dev & True AOA	3
100	Vert Glide Err/Vert Err	1
101	VDIG CMD HDG REL	2
102	Press Alt Rate -2	1
103	Sine & Cos Roll	3
104	Pres Alt-C-RDR Alt	3
105	CMD Alt Err & Scale Change	3
106	Lat Glide Err/Lat Err	1
107	A/C Pitch & CMD A/S	2
108	MAG HDG & CMD Alt	3
109	Discrete Data	2
111-117	D/L MSGS	13
118	D/L RO	2
123	Sine Man CMD HDG	1
124	COS Man CMD HDG	1
125	Sine Man CMD CRS	1
126	Cos Man CMD CRS	1
149	Steer Err	1
---	Discrete & OBC	5
		79 TOTAL

Table 3-9 User RAM Requirements (Cont.)

DT 4		
ITEM	FUNCTION	RAM (WORDS)
1	1/2 Sine & 1/2 Cos Roll	3
2	1/2 Sine & 1/2 Cos Pitch	3
3	1/2 Sine & 1/2 Cos HDG	3
4	P & Y Rates	3
5	R Rate & Press Alt Rate 1	3
6	RDR Alt	2
7	TAS A & Mach 2	3
8	Airstream Temp & True AOA	3
9	Longitude	3
10	Latitude	3
11-13	V_z, V_x, V_y	9
14	Vert & Lift Accel	3
15	Sine & Cos MAG HDG	3
16	Discrete Data	3
17	*Temp Monitor* C	2
18	TACAN BRG & RNG	3
19	Wander Angle	2
20	Platform Azimuth	2
21	Man CMD HDG & CRS	3
23	Press Alt A	2
24	Sys Alt	2
25	Discrete Data Word	1
26-30	OBC 01-05	15
31	SIP 0600	2
32-33	SIP 0700-01	5
34	HDG Correction	2
35-36	X & Y Velocity Corr.	6
37-38	X & Y Tilt Corr.	6
39-40	Sine & Cos. Azimuth Corr	6
41-43	X, Y & Z Gyro Bias Corr	9
44	Discrete Data Word	2

Table 3-9 User RAM Requirements (Cont.)

ITEM	FUNCTION	RAM (WORDS)
45	Delta Wander Angle	3
46	GND Track MAG	2
47	GND SPD	2
48	Wind Dir & Speed	3
49	MDIG CMD HDG & CMD CRS	3
50	VDIG CMD HDG & Range to Dest	3
51 & 53	Delta Long & Lat	6
54	Backup MAG HDG	2
55	OBC Symbol Word	3
56	OBC CMDS	2
57-69	SOP0600-12	36
70-71	SOP0700-01	3
72	Press Alt Rate 1	2
73	Press Alt A	2
74	TAS-A	2
75	MACH # 1	2
76	TRUE AOA	2
77	FREE AIRSTREAM TEMP	1
78	PRESS ALT RATE 2	1
79	PRESS ALT B	2
80	PRESS ALT C	2
81	TRUE AIRSPEED B	2
82	MACH 2	2
83	INDICATED AIRSPEED	2
		217

*NOTE: Refers to item numbers in Appendix A.

to service the data bus message groups is directly related to the data words transmitted and received by each data terminal (see Table 3-10).

The total RAM requirements for the user and data bus interfaces are summarized as:

	DT1	DT2	DT3	DT4
User	42	47	79	217
Data Bus	82	44	104	166
Totals	124	91	183	383

3.4.3 Data Bus Information Transfer Requirements

The data bus information transfer requirements for each of the data terminals and the system as a whole were derived from the information given in the tables and figures of Appendices A and B, respectively. Table 3-11 is a tabulation based upon the terminal to terminal information transfer requirements and is organized to arrange the information into message groups. A total of 13 message groups were developed and configured to minimize the overall data bus usage. These message group structures are a compromise between the conflicting requirements associated with the number of data words, overhead (Command, Status words) and individual word or bit update requirements. Each message group identifies the source, sink, number of data words and transfer rate as follows:

$$x_1 x_2 - x_3 - x_4$$

x_1 = Source data terminal number

x_2 = Sink data terminal number

x_3 = Number of data words in message group

x_4 = Message group transfer rate

Table 3-12 identifies the data bus service time required by each of the four data terminals by organizing the individual message groups transmitted or received for each data terminal. Each message group is burdened by an offer, command and status word, along with 15 usec gap time. The resulting normalized total time (usec/second) represents the time each of the data terminals must utilize a data bus link to

Table 3-10 Data Bus RAM Requirements

DT 1	
MESSAGE GROUP	RAM (WORDS)
12-5-128	10
13-7-32	14
14-7-8	14
14-7-32	14
14-5-128	10
41-10-8	20
	82 TOTAL
DT 2	
MESSAGE GROUP	RAM (WORDS)
12-5-128	10
23-4-16	8
24-5-8	10
24-6-128	12
42-2-8	4
	44 TOTAL
DT 3	
MESSAGE GROUP	RAM (WORDS)
13-7-32	14
23-4-16	8
34-8-32	16
43-18-8	36
43-15-32	30
	104 TOTAL
DT 4	
MESSAGE GROUP	RAM (WORDS)
14-7-8	14
14-7-32	14
14-5-128	10
24-5-8	10
24-6-128	12
34-8-32	16
41-10-8	20
42-2-8	4
43-18-8	36
43-15-32	30
	166 TOTAL

Table 3-11 Data Bus Information Transfer Requirements

FUNCTION	FROM DT NO.	TO DT NO.	BITS	USER RATE (PER/SEC)	USER (BPS)	FIGURE (APPENDIX B)	COMMENTS
APC Test Complete	1	2	1	8	8	8	
IMU-Sine & Cos Roll	1	2	24	128	3000	15	Data Bus Message Group
IMU-Sine & Cos Pitch	1	2	24	128	3000	16	12-5-128
IMU-Sine & Cos Hdg	1	2	24	128	3000	19	
Radar Altitude	1	3	13	20	360	6	
TACAN Bearing	1	3	16	20	160	10	
TACAN Range	1	3	16	20	160	10	
ILS Vert Error	1	3	9	10	90	13	
ILS Lateral Error	1	3	9	10	90	13	
IMU-Sine & Cos Roll	1	3	22	10	220	15	
IMU-A/C Pitch	1	3	12	10	120	16	Data Bus Message Group 13-7-32
OBC Status	1	4	7	8	56	4	
Radar Altitude	1	4	13	20	260	6	
TACAN BRG	1	4	16	20	320	10	
TACAN RNG	1	4	16	20	320	10	
IMU-$\frac{1}{2}$ Sine & $\frac{1}{2}$ Cos Roll	1	4	24	128	3000	15	
IMU-Roll Rate	1	4	12	8	96	15	
IMU-$\frac{1}{2}$ Sine & $\frac{1}{2}$ Cos Pitch	1	4	24	128	3000	16	
IMU-Pitch Rate	1	4	12	8	96	16	
IMU-$\frac{1}{4}$ Sine & $\frac{1}{2}$ Cos Hdg	1	4	24	128	3000	19	
IMU-Yaw Rate	1	4	12	8	96	19	
IMU-Platform Azimuth	1	4	16	8	128	19	Data Bus Message Group 14-7-8

Table 3-11 Data Bus Information Transfer Requirements (Cont.)

FUNCTION	FROM DT NO.	TO DT NO.	BITS	USER RATE (PER/SEC)	USER (BPS)	FIGURE (APPENDIX B)	COMMENTS
Vx	1	4	18	32	576	20	
Vy	1	4	18	32	576	20	Data Bus Message Group 14-7-32
Vz	1	4	18	32	576	20	
Az	1	4	12	8	96	20	Data Bus Message Group 14-5-128
Temp Monitor C	1	4	12	8	96	21	
IMU Discretes	1	4	5	8	40	22	
MAG HDG	2	3	16	10	320	10	
AHRS-Sine & Cos Roll	2	3	22	10	220	15	
AHRS-Pitch	2	3	11	10	110	16	
Steering Error	2	3	12	8	96	17	
Fuel Quantity	2	3	6	1	6	17	
Lox Qty	2	3	1	10	10	25	Data Bus Message Group 23-4-16
OBC Status	2	4	3	8	24	4	
Discrete	2	4	1	8	8	8	
AHRS-Sine MAG HDG	2	4	11	8	88	11	
AHRS-Cos MAG HDG	2	4	11	8	88	11	

Table 3-11 Data Bus Information Transfer Requirements (Cont.)

FUNCTION	FROM DT NO.	TO DT NO.	BITS	USER RATE (PER/SEC)	USER (BPS)	FIGURE (APPENDIX B)	COMMENTS
Display Data - SOP0600	4	3	20	32	640	9	
Display Data - SOP0601	4	3	20	32	640	9	
Display Data - SOP0602	4	3	22	32	704	9	
Display Data - SOP0603	4	3	14	8	112	9	
Display Data - SOP0604	4	3	22	8	176	9	
Display Data - SOP0605	4	3	19	32	608	9	
Display Data - SOP0606	4	3	23	32	736	9	
Display Data - SOP0607	4	3	9	8	72	9	
Display Data - SOP0608	4	3	21	32	672	9	
Display Data - SOP0609	4	3	19	32	608	9	
Display Data - SOP0610	4	3	19	8	152	9	
Display Data - SOP0611	4	3	19	8	152	9	
Display Data - SOP0612	4	3	19	8	152	9	
MAG HDG Backup	4	3	12	8	96	11	
GND SPD	4	3	12	8	96	12	
Wind Dir & Speed	4	3	18	8	144	12	
CMD HDG & CRS	4	3	24	8	192	12	
RNG to Dest	4	3	12	8	96	12	
OBC Symbol Word	4	3	24	8	192	12	
CMD HDG Rel	4	3	12	8	96	14	
Discretes	4	3	7	10	70	25	
SOP0700 & 0701 Equivalent	4	3	24	8	192	26	
							Data Bus Message Groups 43-18-8 43-15-32

Table 3-11 Data Bus Information Transfer Requirements (Cont.)

FUNCTION	FROM DT NO.	TO DT NO.	BITS	USER RATE (PER/SEC)	USER (BPS)	FIGURE (APPENDIX B)	COMMENTS
AHRS-$\frac{1}{2}$ Sine & $\frac{1}{2}$ Cos Roll	2	4	24	128	3000	15	
AHRS-Roll Rate	2	4	12	8	96	15	
AHRS-$\frac{1}{2}$ Sine & $\frac{1}{2}$ Cos Pitch	2	4	24	128	3000	16	
AHRS-Pitch Rate	2	4	12	8	96	16	
AHRS-Pitch Angle	2	4	12	8	96	16	
AHRS-$\frac{1}{2}$ Sine & $\frac{1}{2}$ Cos MAG HDG	2	4	24	128	3000	19	
OBC Status	3	4	32	8	256	4	
Discretes	3	4	2	8	16	8	
Display Mode Select	3	4	10	32	320	9	
Discrete	3	4	1	8	8	22	
MAN CMD HDG	3	4	12	8	96	23	
MAN CMD CRS	3	4	12	8	96	23	
SIP0700-SIP0701	3	4	39	8	312	26	
							Data Bus Message Groups 34-8-32
OBC CMDS	4	1	14	8	112	4	
Discrete Data	4	1	5	8	40	22	
IMU Corr Factors	4	1	180	8	1440	24	
							Data Bus Message Group 41-10-8
OBC CMDS	4	2	1	8	8	4	
Pulse Mode	4	2	1	8	8	18	Data Bus Message Groups 42-2-8

Table 3-11 Data Bus Information Transfer Requirements (Cont.)

FUNCTION	FROM DT NO.	TO DT NO.	BITS	USER RATE (PER/SEC)	USER (BPS)	FIGURE (APPENDIX B)	COMMENTS
Mach 1	4	3	10	20	200	2	
Indicated Airspeed	4	3	10	20	200	2	
True Angle of Attack	4	3	11	10	110	3	
OBC CMDS	4	3	11	8	88	4	
Press Alt Rate 2	4	3	9	10	90	5	
Press Alt B	4	3	9	20	180	6	
Press Alt C	4	3	10	20	200	6	
True Airspeed-B	4	3	11	20	220	7	

Note: Data Bus Message Group Definition X_1 X_2-X_3-X_4 From/To-No. of Data Words-Message Rate

Table 3-12 DT Data Bus Service Time (Transmitting and Receiving)

DT1		
MESSAGE GROUP	USEC/UPDATE INTERVAL	USEC/SEC
12-5-128	175 usec/7812.5 usec	22400
14-5-128	175 usec/7812.5 usec	22400
13-7-32	215 usec/31250 usec	6880
14-7-32	215 usec/31250 usec	6880
14-7-8	215 usec/125000 usec	1720
41-10-8	275 usec/125000 usec	2200
Total DT1 Data Bus Service Time = 62480 usec/sec		
DT2		
MESSAGE GROUP	USEC/UPDATE INTERVAL	USEC/SEC
12-5-128	175 usec/7812.5 usec	22400
24-6-128	195 usec/7812.5 usec	24960
23-4-16	155 usec/62500 usec	2480
24-5-8	175 usec/125000 usec	1400
42-2-8	95 usec/125000 usec	760
Total DT2 Data Bus Service Time = 52000 usec/sec		
DT3		
MESSAGE GROUP	USEC/UPDATE INTERVAL	USEC/SEC
13-7-32	215 usec/31250 usec	6880
34-8-32	235 usec/31250 usec	7520
43-15-32	375 usec/31250 usec	12000
23-4-16	155 usec/62500 usec	2480
43-18-8	435 usec/125000 usec	3480
Total DT3 Data Bus Service Time = 32360 usec/sec		

Table 3-12 DT Data Bus Service Time (Cont.)

DT4		
MESSAGE GROUP	USEC/UPDATE INTERVAL	USEC/SEC
14-5-128	175 usec/7812.5 usec	22400
24-6-128	195 usec/7812.5 usec	24960
14-7-32	215 usec/31250 usec	6570
34-8-32	225 usec/31250 usec	7200
43-15-32	375 usec/31250 usec	12000
14-7-8	215 usec/125000 usec	1650
24-5-8	175 usec/125000 usec	1400
41-10-8	275 usec/125000 usec	2200
42-2-8	115 usec/125000 usec	920
43-18-8	435 usec/125000 usec	3480
Total DT4 Data Bus Service Time = 82780 usec/sec		

NOTE: Message Times Consist of: Offer Word Time + Command Word Time + Status Word Time + (Nx Data Word Time) + 15 usec Gap Time.

maintain the present user interface information requirements. Data terminals 1 through 4 will utilize data bus service 6, 5, 3 and 8% of the time, respectively. Table 3-13 is the sum total of the GPMS data bus usage based upon the 13 identified message groups and represents 11% of a single data bus channels capability. Figure 3-23 illustrates a typical message group activity on the data bus; all 13 message groups can be transmitted within the maximum update interval (128 times per second) occupying 2955 usec of the available 7812.5 usec.

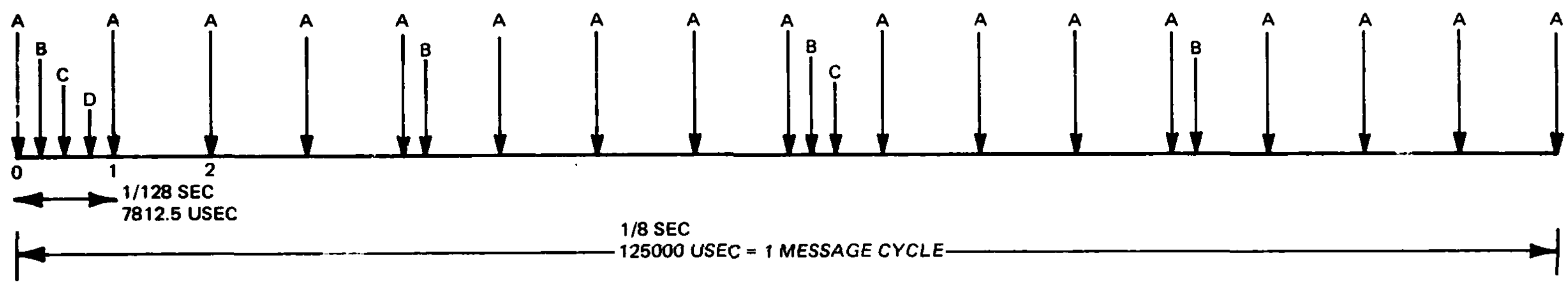
The impact of the flight mission phase upon the information transfer requirements is dependent upon the user's interface requirements. A cursory examination of the information transfer requirements of the selected system indicates it is relatively insensitive to mission phase. The causes for changes in information transfer requirements are associated with the mode changes of equipment. These mode changes are initiated automatically as a function flight phase, flight characteristics, external stimuli, etc., or manually in response to flight operator inputs.

The IMU navigation requirements were examined as a function of mission phase. The IMU inertial navigation mode is required during all phases of flight. During preflight, the unit goes through the initialize, prealign and align modes prior to the inertial navigation mode. During these preliminary modes, information for establishing initial latitude, longitude, velocities, wander angles, and gyro/accelerometer scale and correction factors are required by the system. When alignment is completed and the unit is in the inertial mode, this information is no longer required. Output information to the IFU remains relatively constant during all phases. Table 3-13A indicates that approximately 4 KBPS more information is required during the alignment modes of the pre-launch phase than during the inertial navigation mode.

The OBC functions operate in a command activated mode and in continuous monitor mode for the various OBC functions. In each of these modes, flight and nonflight inhibits allow certain functions to be performed or establish the validity of the OBC data. In the command activated mode, the flight operator initiates OBC test sequences. It may be initiated in flight or during preflight. Typically, OBC command initiated operation would be performed during prelaunch, cruise to engagement or flight station and during the return segment of the mission profile. Based upon the transmission of the OBC operational code word, the OBC symbol word, the MDIG

Table 3-13 Total Data Bus Message Utilization

MESSAGE GROUP	MESSAGE TIME FOR ONE MESSAGE	TOTAL MESSAGE TIME (USEC/SEC)
12-5-128	175	22400
13-7-32	215	6880
14-7-8	215	1720
14-7-32	215	6880
14-5-128	175	22400
23-4-16	155	2480
24-5-8	175	1400
24-6-128	195	24960
34-8-32	235	7520
41-10-8	275	2200
42-2-8	115	920
43-18-8	435	3480
43-15-32	375	12000
		TOTAL 108360



MESSAGE GROUP TIME = OFFER WORD TIME + COMMAND WORD TIME + STATUS WORD TIME + 15 USEC GAP TIMES + (N X DATA WORD TIME)

A = MSG GROUPS 12-5-128, 14-5-128 & 24-6-128; TOTAL MSG TIME = 545 USEC/7812.5 USEC

B = MSG GROUPS 13-7-32, 14-7-32, 34-8-32, & 43-15-32; TOTAL MSG TIME = 1040 USEC/31240 USEC

C = MSG GROUPS 23-4-16; TOTAL MSG TIME = 155 USEC/62500 USEC

D = MSG GROUPS 14-7-8, 24-5-8, 41-10-8, 42-2-8, 43-18-8; TOTAL MSG TIME = 1215 USEC/125000 USEC

Figure 3-23 Data Bus Message Activity

5916-39

Table 3-13A IMU Navigation Modes Data Transfer Requirements

	PREFLIGHT		PREFLIGHT & FLIGHT		
INPUT DATA	INITIALIZE	PREALIGN	ALIGN	INERTIAL NAV	BPS
Init/Delta Latitude	X	X	X	-	144
Init/Delta Longitude	X	X	X	-	144
Baro Alt	X	X	X	X	160
Init/Delta Wander Angle	X	X	X	-	120
X, Y, Z Gyro Torque Corr	X	X	X	-	432
X, Y, Z Gyro Scale Corr	X	X	X	-	1152
X, Y, Z Accel Offset Corr	X	X	X	-	384
X, Y, Z Accel Scale Corr	X	X	X	-	288
X, Y Initial Velocity	X	X	-	-	1152
Input Word Code	X	X	X	X	200
Gyro Torque Pulses	-	X	X	X	
				4176 BPS Max/360 BPS Min	
OUTPUT DATA					
Latitude	X	X	X	X	136
Longitude	X	X	X	X	144
X, Y, Z Velocity	X	X	X	X	1296
Vertical Accel	X	X	X	X	96
System Altitude	X	X	X	X	120
Wander Angle	X	X	X	X	140
Output Mode Code	X	X	X	X	176
Accelerometer Pulses	-	X	X	X	
				2108 BPS Max/2108 BPS Min	
NOTE: X = Data Required					

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OBC symbol words, the OBC discrete data word, and OBC data words, the change in information transfer would be a maximum of 1.6 KBS in the commanded mode.

The data link information was similarly analyzed. The data link may be operational during all phases of a mission. Data link information was assumed available or not depending upon whether a data link transmitting station is active and addressing the aircraft. The data link messages and replies constitute a 3.4 KBPS increase in the data information transfers when active. These changes in information transfer requirements are relatively insignificant compared to the 108 KBPS previously identified.

3.4.4 Installation

The No. 5 F-14 test aircraft was selected as a typical test bed for AAES. This aircraft has been used for avionics system, power system, environmental control system, and weapon separation tests. More recently, it has been used to evaluate the radar guidance weapons system (RGWS). Significant equipment volumes are available since this aircraft does not contain all the equipment of a production item. The major avionics/ equipment which are not presently installed are the complete AWG-9 air superiority weapon control system (28 major pieces of equipment) the gun and gun controller, and vertical display group (see Figure 3-24). The AWG-9 computer subsystem will be reinstalled to provide the required interface to DT4, which will provide the equivalent CSDC/AWG-9 computer IFU interface. In addition, the vertical display indicator group (VDIG converter, VDI and HUD) will be installed, as well as the AWG-9 Tactical Information Display (TID). These equipments are required to provide the navigational and OBC display capability. The gun compartment presently contains instrumentation and can provide additional equipment areas if the need arises. Presently, there appears to be no need to install AAES equipment in this area.

Figure 3-25 illustrates the installation of a complete AAES/GPMS system in test aircraft No. 5. The equipment inventory is based on the following considerations and requirements.

Two SOSTEL Master Units (MU) are located in reference locations A and G. These units are serviced by two GPMS data terminals located in the same referenced locations. Since the SOSTEL system is considered an aircraft subsystem, these

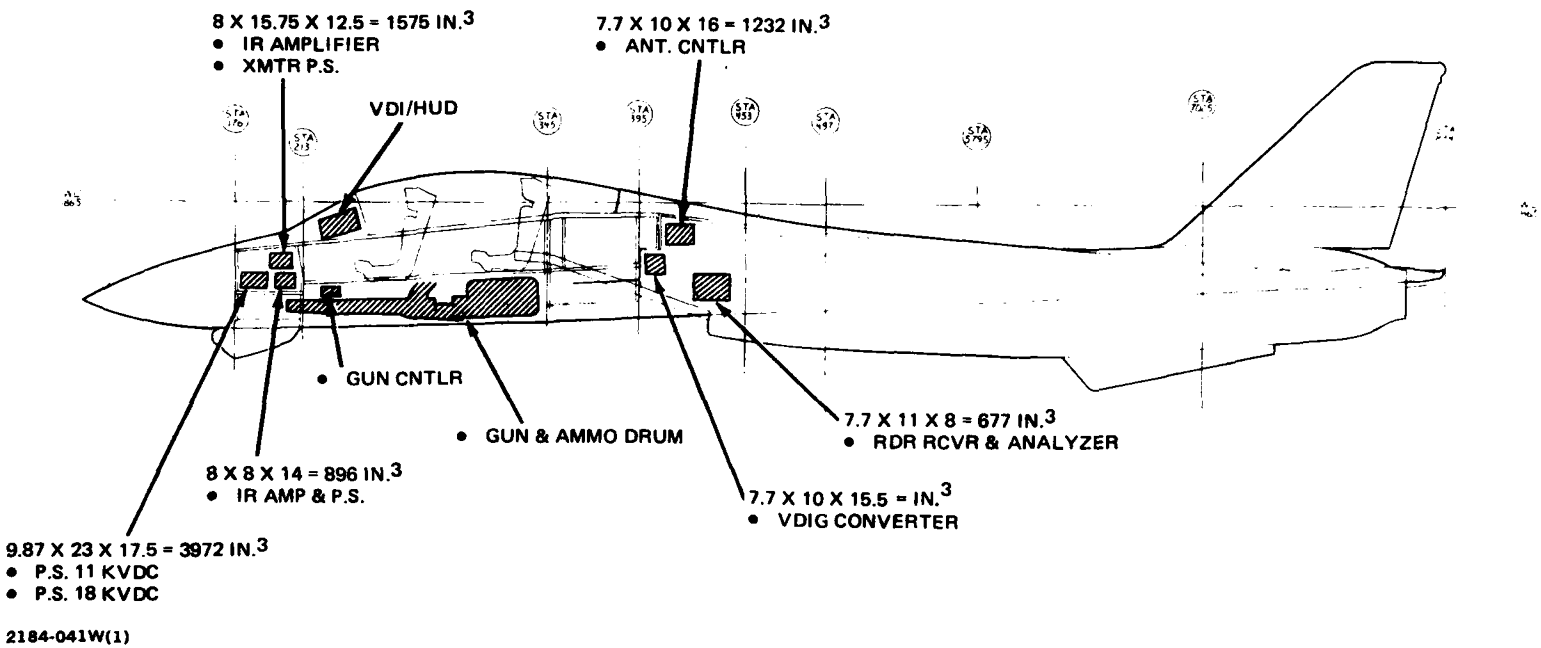

Figure 3-24 Test Aircraft No. 5 Port Profile Illustrating Volumes Available and Identifying Avionics Presently Not Installed (Sheet 1 of 2)

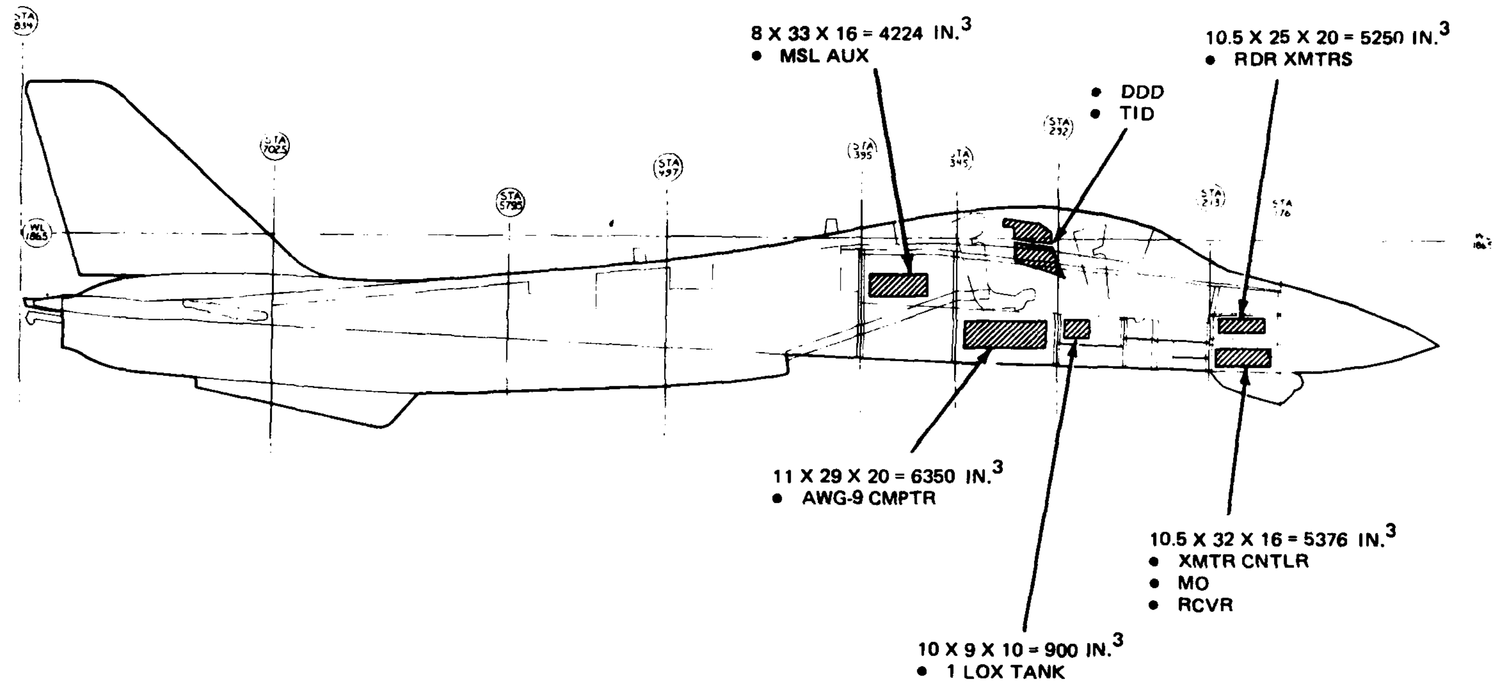

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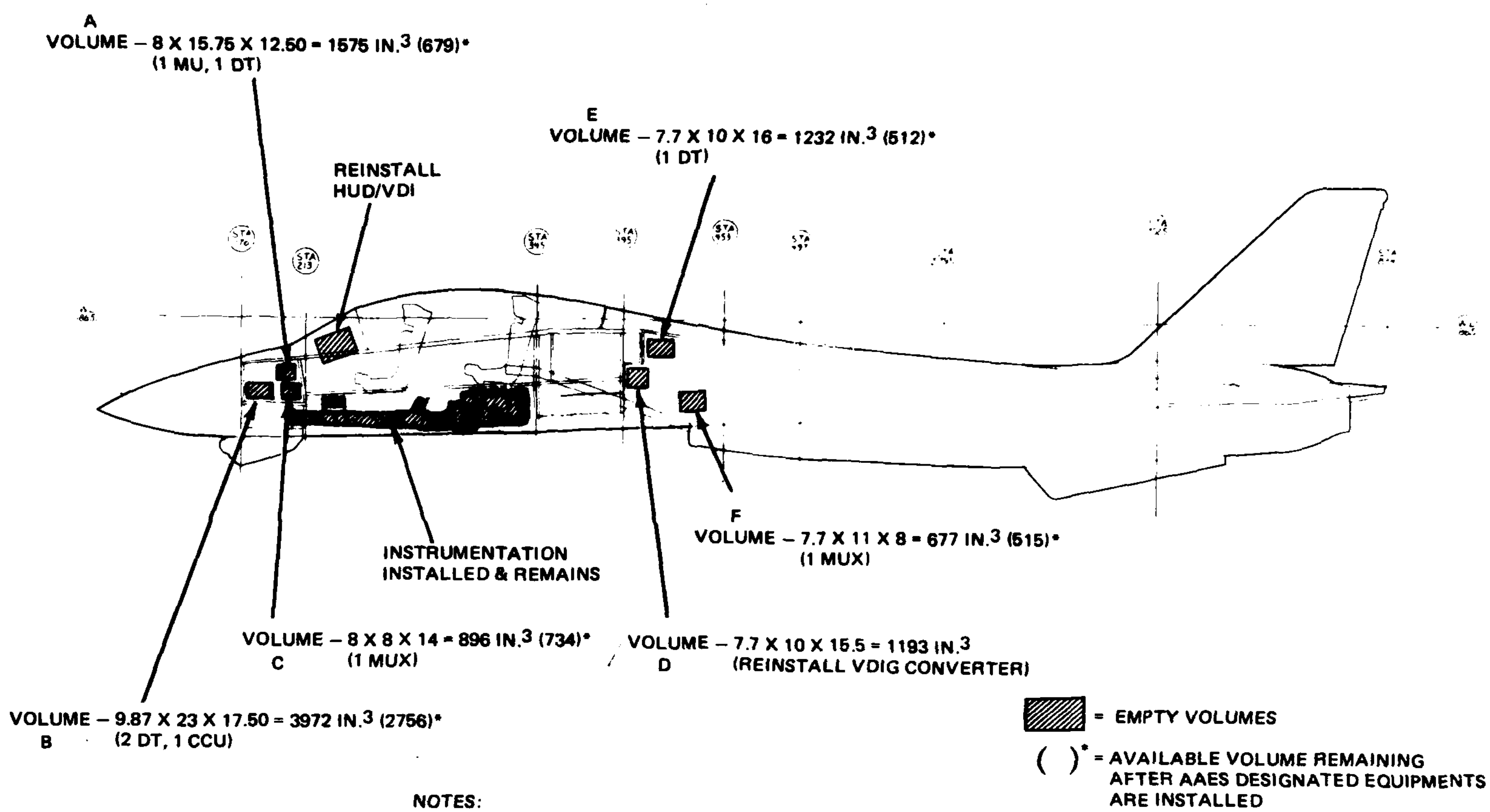
Figure 3-24 Test Aircraft No. 5 Starboard Profile Illustrating Volumes Available and Identifying Avionics Presently Not Installed (Sheet 2 of 2)



NOTES:

1. VOLUME LIST HT(WL) X WIDTH(STA) X LENGTH(BL)

2.

MUs	6 X 8 X 12 (576)	SSPC = 2 IN.^{3} (AVG)
CCDP	6 X 12 X 10 (720)	ALLOW 5 IN.^{3} PER SSPC
PP	4 3/8 X 4 X 5 3/4 = (100)	
MUX	3 X 6 X 9 (162)	
DMUX	3 X 6 X 9 (162)	
MUX/DMUX	4 X 8 X 10 (320)	
DT (GPMS)	4 X 8 X 10 (320)	
HVDC GEN.	8 1/2 DIAM X 21 MAX. (179)	
CONVERTER	7.5 X 8.75 X 20.25 MAX. (1329)	
CCU	6 X 8 X 12 (576)	

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Figure 3-25 F-14 No. 5 Port AAES Profile (Sheet 1 of 2)

REFERENCE LOCATION	AAES EQUIPMENTS										
	MU	DT	MUX/DMUX	SSPC	PP	CCDP	HVDC	CONV	CCU	MUX	DMUX
A	1	1									
B		2							1		
C										1	
D	REINSTALLED VDIG CONVERTER										
E		1									
F										1	
G	1	2									
H		1	2	200					1		1
I			1								
J						1					
K					1						
L	REINSTALLED AWG-9 COMPUTER SYSTEM										
M		1	2	200				1			1
N							1				
TOTAL	2	8	5	400	1	1	1	1	2	2	2

GPMS DT	LOCATION
NO. 1	B
NO. 2	G
NO. 3	E
NO. 4	M

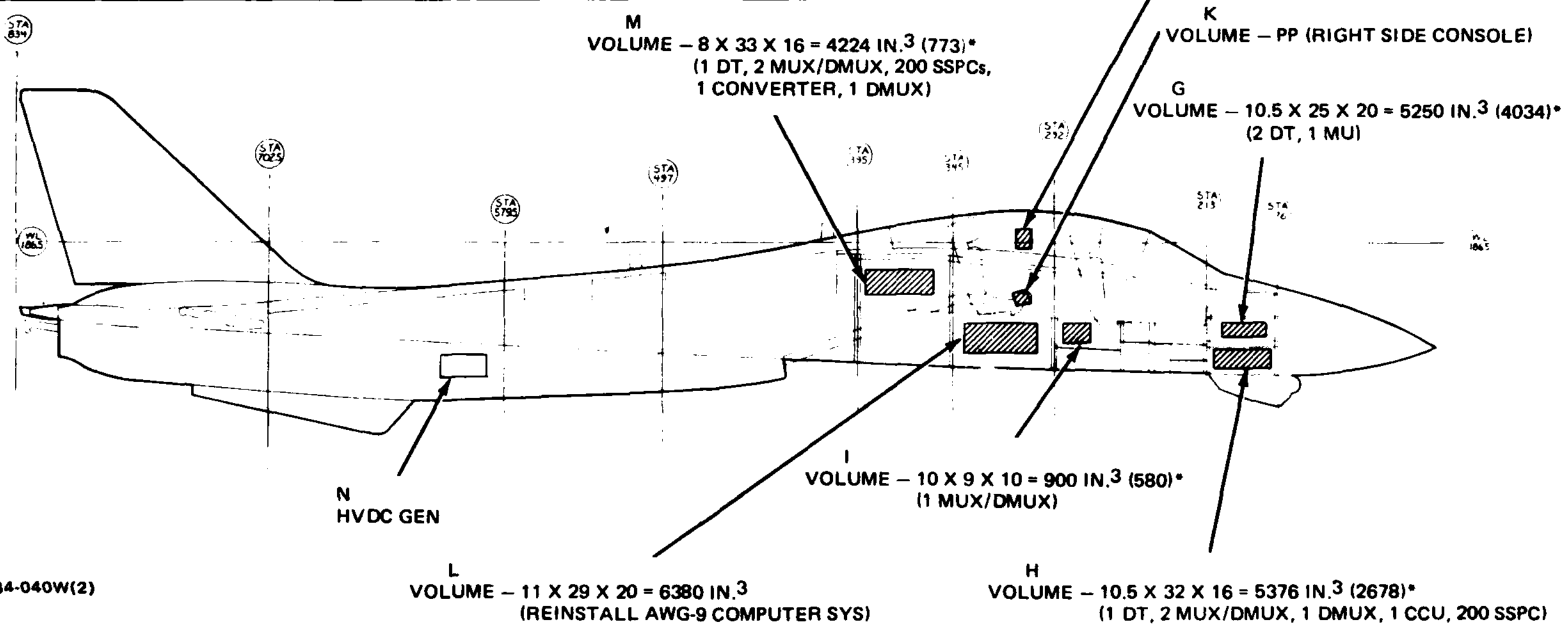

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Figure 3-25 F-14 No. 5 Starboard AAES Profile (Sheet 2 of 2)

GPMS data terminals would provide the bus interface and bus protocol and MU serial or parallel interface requirements when the SOSTEL system is operating in conjunction with GPMS data terminals. If the SOSTEL system is operating without GPMS, these two data terminals are not required, since the SOSTEL MUs will have a two channel dedicated bus interface.

The four data terminals identified in this report are located in reference locations B (DT1), G (DT2), E (DT3) and M (DT4).

Two additional data terminals supporting the SOSTEL system with user interfaces compatible for non-SOSTEL input and output signals are located in reference locations B and H. Two double channel cable control units will provide channel polling offers for the SOSTEL (MUs) and GPMS avionics data terminals. These units are located in reference locations B and H.

Two locations, one forward of the pilot (H) and one aft of the NFO (M) were selected to contain the housing for 2 MUX/DMUX, 1 DMUX and their associated SSPCs. This installation allows for two centralized locations for SOSTEL terminals and SSPCs that are located in the areas of the majority of avionic loads and signal sources. Location M will also contain the PGS converter. An additional MUX/DMUX is located between locations H and M in location I. Two MUX terminals are to be installed in forward (C) and aft (F) locations.

The pilot's panel will be installed in the NFO's right side console (reference location J). The CCDP (nonflight unit) can be installed for ground checkout in the area which is normally occupied by the AWG-9 Detail Data Display (DDD). This will allow ground correlation between the operation of both displays and the system by one operator.

Section 4

FUTURE REDESIGNED AVIONICS INCORPORATING MIL-STD-1553A INTERFACES

A survey of the F-14A avionics was performed to identify whether a future redesign could incorporate MIL-STD-1553A data bus interface circuitry. The equipment selected are those which were considered during some phase of this study. This effort did not justify the incorporation of data bus circuitry because this is largely dependent upon factors not considered during this study. The rationale for or against incorporating a data bus interface may be as wide and varied as:

- Avionics update is required for other functional reasons
- Limited or widely utilized military avionics
- Equipment size or information transfer requirements
- Equipment distribution
- New equipment for CILOPS or new aircraft
- Data bus loading constraints.

Table 4-1 lists the available card space of the equipment surveyed. This card space was identified by physical examination of the units or their drawing and consulting the cognizant engineers. It is based upon deletion of the existing interface circuitry which would be replaced by the data bus interface circuitry.

A minimum data bus interface is illustrated on Figure 4-1. It is designed to provide a compatible MIL-STD-1553A interface for data terminals organized about microprocessor or hardware users. This design, using existing or under development components, is mounted on a 4 in. x $4\frac{1}{2}$ in. card. The primary elements of this two channel card are:

- Transformers and Isolation: Provide coupling and isolation between the transmitter/receiver and the data bus.

Table 4-1 1553 Universal Buffer Functions

1 RCV BIPHASE	Two inputs from the receiver accepting unipolar complementary TTL compatible data.
2 XMIT BIPHASE	Two outputs to the transmitter providing unipolar complementary TTL compatible data.
3 TRANSMIT COMMAND INTERRUPT	An interrupt occurring at bit time 6 identifying the received word as a transmit command addressed to this unit.
4 RECEIVE COMMAND INTERRUPT	An interrupt occurring at bit time 6 identifying the received word as a receive command addressed to this unit.
5 BROADCAST COMMAND INTERRUPT	An interrupt occurring at bit time 6 identifying the received word as a command to be recognized by all units.
6 ZERO MESSAGE FIELD	A status bit indicating the 5 bit message field of a command addressed to this terminal is all zeros.
7 ZERO WORD FIELD	A status bit indicating the 5 bit word field of a command addressed to this terminal is all zeros.
8 VALID WORD	A status bit indicating a received word of a message addressed to this terminal has all the characteristics for validity. This implies correct sync, Manchester formatted data, correct number of bits, and odd parity. Valid word occurs during the received word parity time.
9 INVALID WORD	A status bit indicating improper Manchester or incorrect parity. Invalid word may occur anytime during a received word after the sync.
10 DATA AVAILABLE	A status bit indicating the contents of the receive register has been transferred to the receive buffer and therefore the received word is available to the user.
11 DATA REQUEST	A status bit indicating the contents of the transmit buffer has been loaded into the transmit register and therefore a new word can be loaded into the transmit buffer.
12 MESSAGE COMPLETE	A status bit indicating the last data word is in the process of being received or the last data word is being transmitted.
13 IDLE/BUSY	A status bit indicating whether either or both inputs from the receiver are transitioning.
14 COMMAND SYNC	A sixteen microsecond envelope bracketing the data field of command/status words for use during serial receive operation.

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Table 4-1 1553 Universal Buffer Functions (Cont)

15 DATA SYNC	A 16 microsecond envelope bracketing the data field of data words for use during serial receive operation.
16 SERIAL RECEIVE NRZ	A serial sixteen bit non-return to zero signal covering the data field of all received words.
17 RECEIVE CLOCK	A sixteen bit serial clock derived from the received manchester data of all words.
18 SEND DATA	A sixteen microsecond envelope bracketing the data field of all transmitted words for use during serial transmit operation.
19 SEND CLOCK	A sixteen bit serial clock under the send data envelope for shifting in transmit NRZ data.
20 8/16 BIT DATA BUS	A sixteen bit parallel tri-state input/output interface for accepting data from the receive buffer or putting data in the transmit buffer.
21 BUS CONTROLLER	An input control signal identifying in which the mode the buffer is to operate. Users acting as bus controller or backup bus controllers will control this input. Users not capable of acting as bus controllers will have this input handwire. The primary distinction being the ability to initiate commands and decode received commands or offers.
22 TRANSMIT MODE	An input signal causing the buffer to start transmissions depending upon the state of bus controller and auto command response.
23 8/16 BIT DATA BUS OPERATION	An input signal identifying the mode in which the data bus in to operate, one 16-bit byte or two 8-bit bytes.
24 POR/INITIALIZE	An input signal to initialize the buffer on power turn on or subsequently.
25 STATUS ENABLE	An input signal which when active takes the tri-state status data out of the high impedance state. When used with a processor, the buffer status bits may be wire "or'ed" to the 8/16 bit data bus. When used with a "dumb" terminal, this output may be hardwired providing active status (may be used for control functions) information continuously.
26 ADDRESS (5)	Five inputs which would normally be hardwired identifying this units address.
27 CLOCK	The basic 12 MHz clock required for operation of the unit.
28 TRANSMIT SYNC POLARITY	An input signal identifying the type of sync (command/status or data) which the buffer is to generate for a transmit word.
29 TAKE DATA ENABLE	An input pulse which directs the unit to accept and place into the transmit buffer the data on the 8/16 bit data bus. Two take data enable pulses are required for 8 bit operation.

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Table 4-1 1553 Universal Buffer Functions (Cont)

30 READ DATA ENABLE	An input pulse which places the contents of the receive buffer onto the 8/16 bit data bus. Two read data enable pulses are required for 8 bit operation.
31 INTERRUPT ACKNOWLEDGE	An input signal indicating acknowledgement of the bit time 6 interrupts and causing them to be reset.
32 SERIAL TRANSMIT NRZ	A 16 bit serial NRZ input utilized during serial mode of operation. Data is synchronous with the send date envelope and send clock.
33 PARALLEL/SERIAL OPERATION	An input signal identifying the mode of operation of the buffer relative to the user interface.
34 AUTO COMMAND RESPONSE	An input signal causing the buffer to go into a "dumb user" response mode. The buffer will respond to a valid addressed transmit command by initiating the transmission, appending the correct address and sync polarities and terminating transmission after the last commanded word count. The buffer will respond to a valid addressed receive command with the status word, appending the sync polarity, address and message error. This form of operation is useful for those terminals having fixed and a limited number of message groups to receive or transmit.
35 ECHO INHIBIT	The buffer is capable of echoing its own data transmissions along with the receive status information. For those users which may desire to periodically or permanently inhibit or enable this function, this input control is provided.
36 SYNC POLARITY	An input signal identifying the transmit sync to be used for transmit words. This function operates in conjunction with the auto command response and bus controller inputs.

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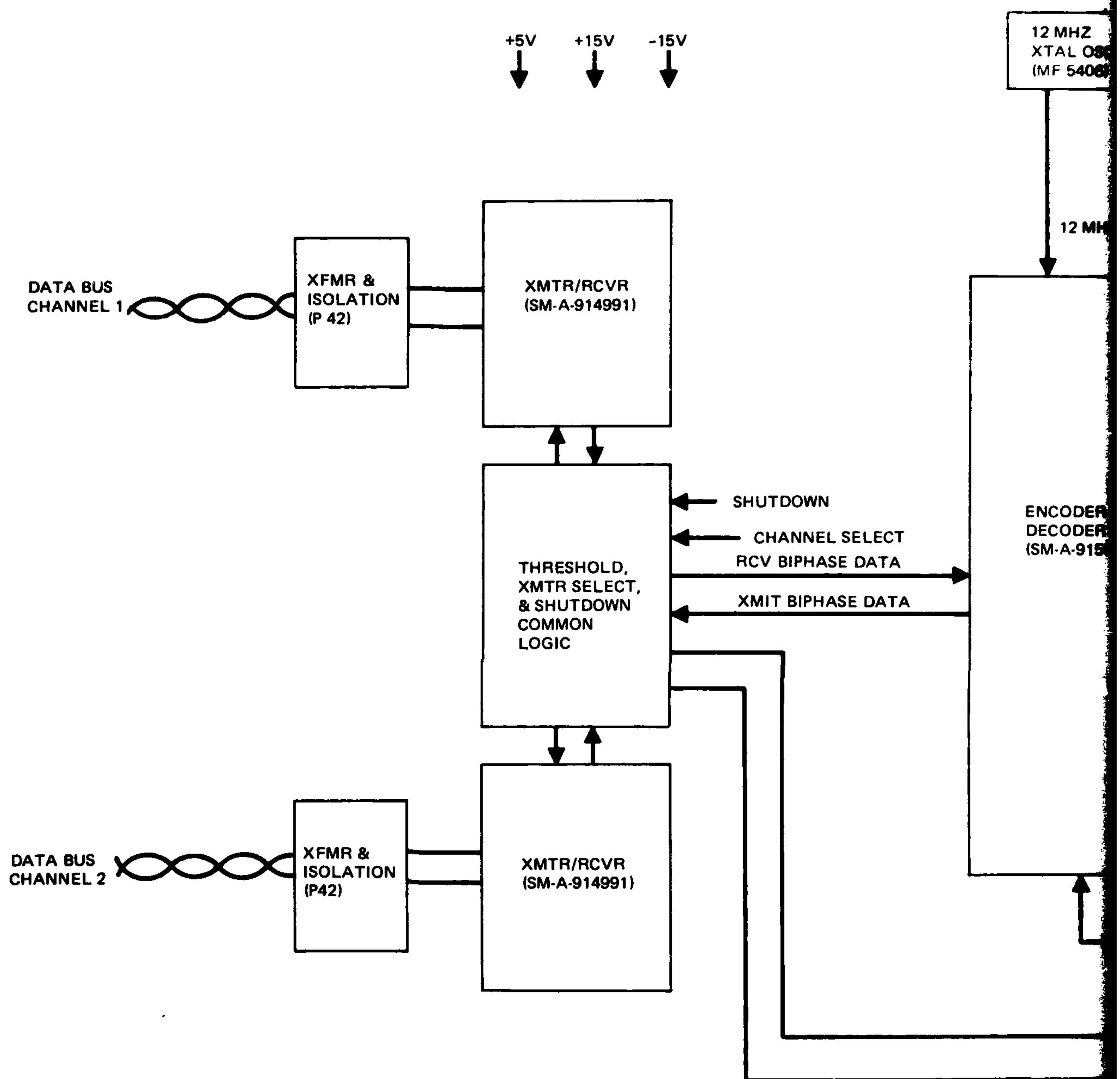

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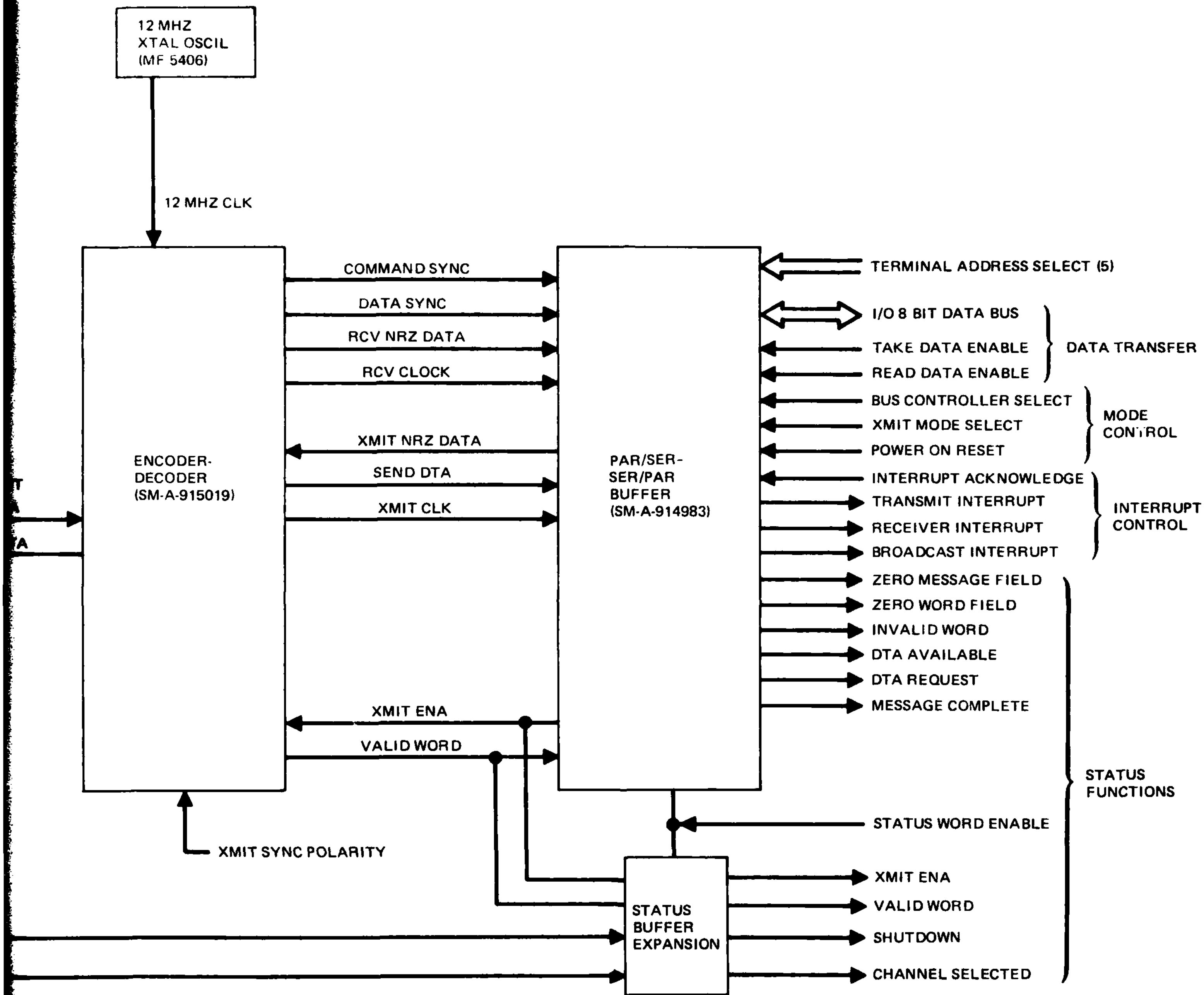


Figure 4-1 Data Bus Interface Card

- Transmitter/Receiver: A single package hybrid designed to provide the transmitted biphase drive capability and obsteperous transmitter inhibit at the closest point to the data bus channel interface. The receiver section provides biphase detection, conversion to TTL levels, bandwidth filtering, and threshold selection.

- Common Logic: The common logic is designed using MSI-TTL circuitry to provide a common path between the receiver/transmitters and the encoder/decoder. It provides threshold adjust circuitry for the receiver, sensitivity selection, and transmitter channel selection as function of the channel upon which the unit was addressed, or user preference. In addition, shutdown circuitry is provided to protect against blabber-mouth terminals.

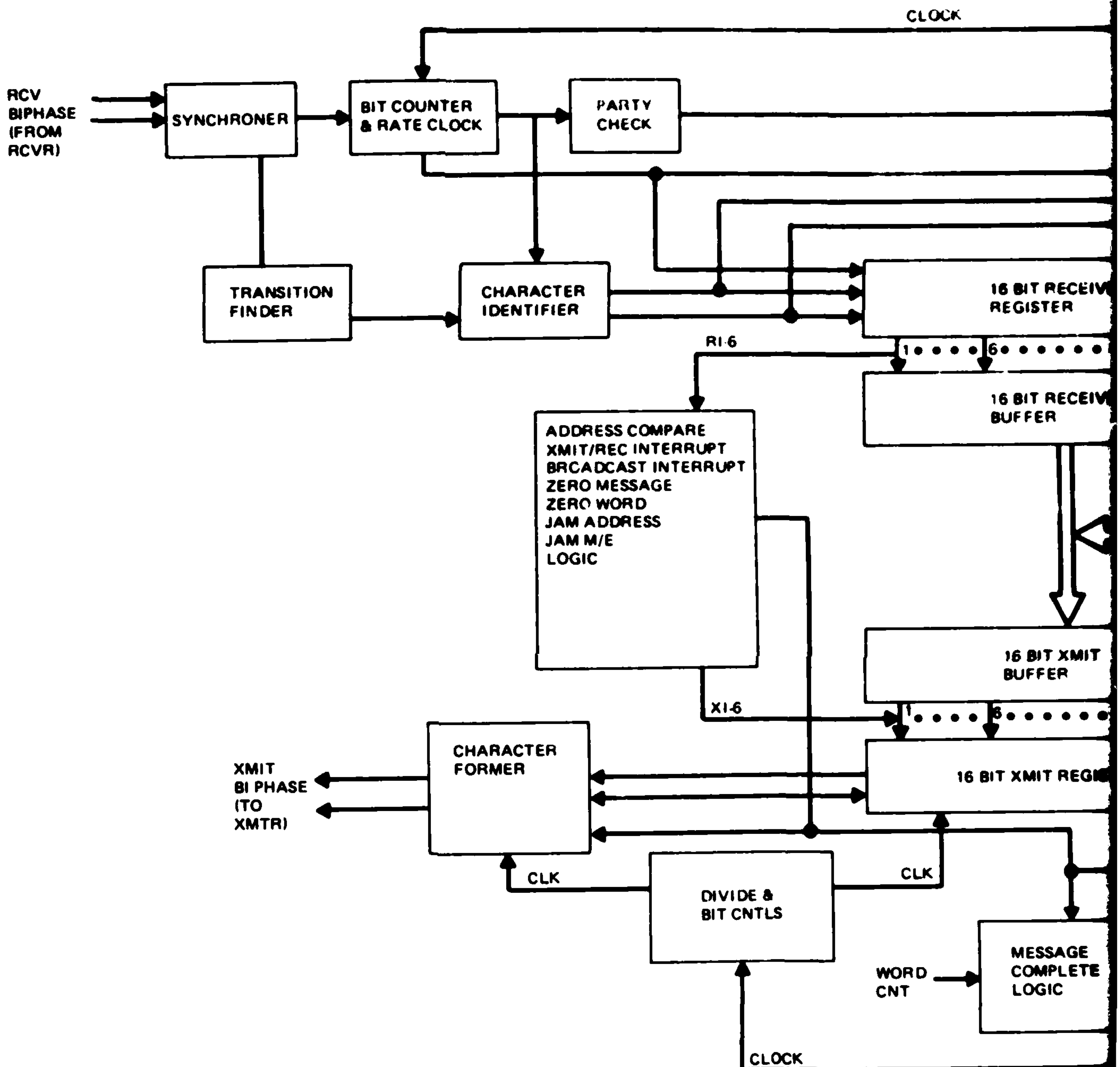
- Encoder/Decoder: The encoder/decoder provides Manchester to NRZ and NRZ to Manchester conversions, and receive and transmit control signals. While the device is a 40 pin LSI, only five receive signals and five transmit signals are required to interface with the buffer or user. The unit is designed to accept 16 bit serial NRZ data from the buffer for transmission. The unit generates the transmit sync polarity as directed and automatically appends the correct parity when transmitting. The receive section detects the presence of received words containing correct sync and Manchester format and generates a 16 usec envelope and clocking signals to shift out to the buffer a 16 bit NRZ word. The type of word (command/status or data) is identified by the envelope. If all conditions of a received word are correct (number of bits, Manchester coding, parity) a valid word signal is generated after each received word.

- Parallel/Serial-Serial/Parallel Buffer: The buffer's primary functions is to provide the serial to/from parallel conversions, the controls, interrupts, and status information for the user. It is designed as a 40 pin-LSI device and maintains the independent transmit/receive paths of the encoder/decoder. Data transfer functions are provided by a 16 bit transmit and a 16 bit receive register which are serviced by a 16 bit transmit buffer and 16 bit receive buffer storage. These are organized in 8 bit bites to accept or deliver data to the 8 bit tri-state bus in response to take and read signals from the user.

Interrupts and controls are generated in response to command word reception of the command type (transmit, receive, broadcast). Mode controls provide the flexibility to initialize the unit, initiate or respond with transmissions, and provide the flexibility for the unit to operate as either a remote terminal responding to commands or as a bus controller initiating commands. Status information is provided as tri-state (or discretes) outputs which alert the user of unique polling offer word fields, data transfer alerts, and critical operating conditions or modes. The unit has several unique and automatic functions such as a message complete function. This operates to alert the user of the thirty-third word transmitted in the case of a bus controller. In addition, as a remote unit, it is generated in response to the correct number of data words received or the correct number of words transmitted and initiates and/or stops transmission. Internal idle line resets cause the unit to revert to the receive mode in the event of message failures.

A future LSI design of this interface combining the encoder/decoder and serial/parallel interface functions and specifically designed for MIL-STD 1553A formats is illustrated in Figure 4-2 (1553 Universal Buffer). The transmitter/receiver section would not be part of this design due to the power dissipation requirements. This 64 pin LSI is conceived to provide the interface to a user which may be an 8 or 16 bit processor or a hardware (so called dumb terminal) terminal. It is capable of providing a serial or parallel interface along with the associated controls and status. The function of each of the input/output pins as presently identified is shown in Table 4-2.

Based upon a two channel bus interface occupying approximately 22½ in. of card space and allowing an additional card for unique user interface requirements it appears that most of the F-14 equipment surveyed (Table 4-1) could accept the required hardware. A future production run of the tabulated avionics could easily contain the required data bus interface circuitry under the same physical envelope based solely on state-of-the art electronics redesign and new layouts.



CLOCK
RCV BIPHASE (FROM RCVR)
SYNCHRONER
BIT COUNTER & RATE CLOCK
PARTY CHECK
TRANSITION FINDER
CHARACTER IDENTIFIER
16 BIT RECEIV
REGISTER
RI-6
16 BIT RECEIV
BUFFER
ADDRESS COMPARE
XMIT/REC INTERRUPT
BRCADCAST INTERRUPT
ZERO MESSAGE
ZERO WORD
JAM ADDRESS
JAM M/E
LOGIC
16 BIT XMIT
BUFFER
XI-6
CHARACTER FORMER
XMIT BI PHASE (TO XMTR)
16 BIT XMIT REGI
CLK
DIVIDE & BIT CNTLS
CLK
WORD CNT
MESSAGE COMPLETE LOGIC
CLOCK

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2

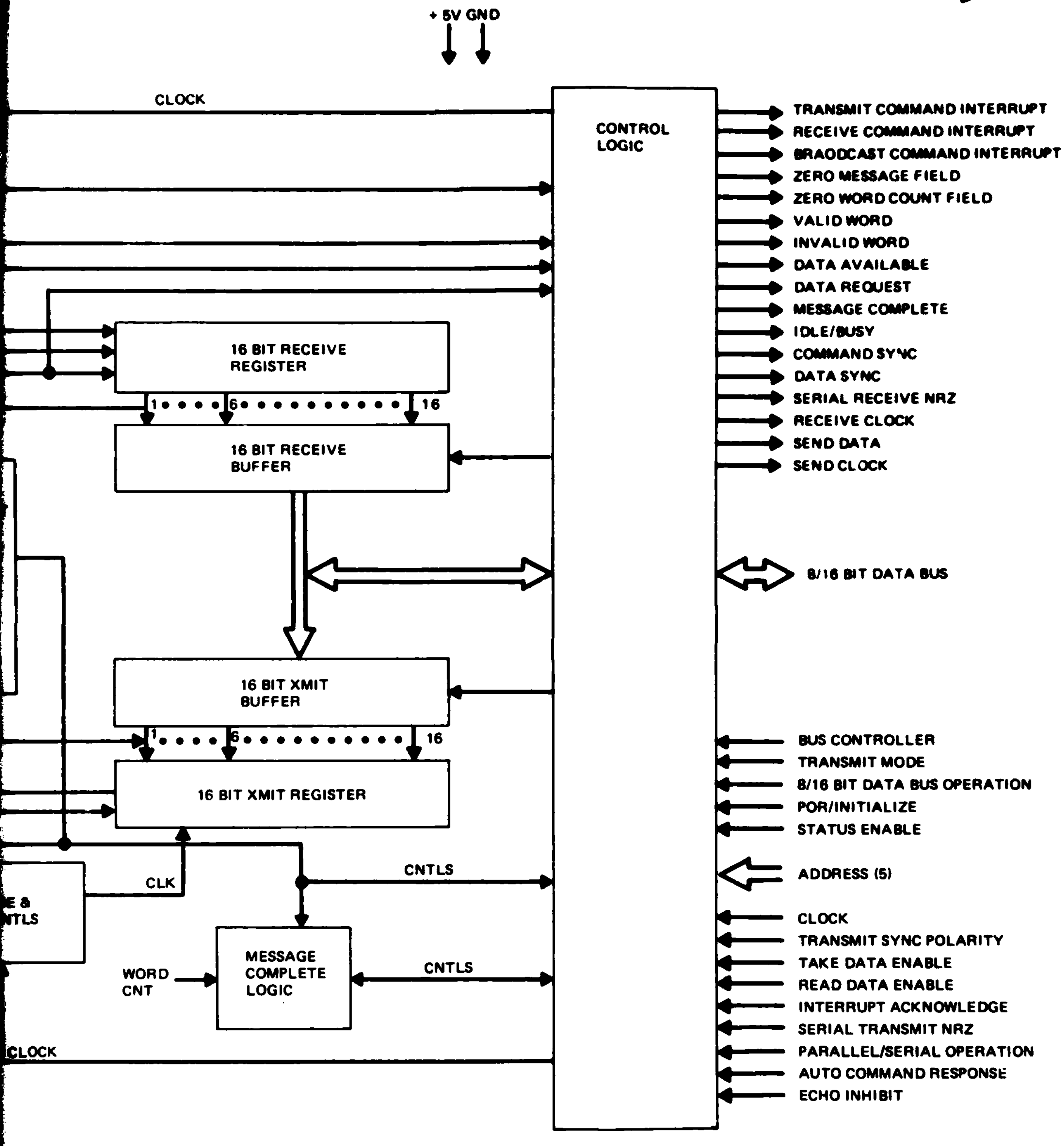

Figure 4-2 1553 Universal Buffer

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Table 4-2 Available Data Bus Space in Surveyed F-14 Avionics

UNIT & NO.	NO. CARDS AVAILABLE	APPROXIMATE CARD/MODULE SIZE	COMMENTS	DATA BUS INTERFACE FITS?
IFU (461)	5	6 in. x 6½ in. (54 Dips)	41 Cards in IFU, Serial Interface - Cards A12 to A16	Yes
MDSC (710)	2-3	6 in. x 6½ in. (54 Dips)	25 Cards in MDSC	Yes
CAP (505)	2	5 in. x 5½ in.	8 Cards in CAP	Yes
DDD (541)	2	5 in. x 4 3/4 in.	19 Cards in DDD	Yes
TID (580)	2	5 in. x 4 3/4 in.	15 Cards in TID	Yes
RMO (001)	3 CARD/ MODULE	3 in. x 4 in. x 9 in.	Card Mounted in Shielded Module	Yes
Low PRF Proc (083)	3	6 in. x 6½ in.		Yes
Ant Servo (081)	1	6 in. x 6½ in.		No
VDIG Conv	3	8 in. x 4½ in. (50 Dips)	1½ Card for VDI, 1½ Card for HUD	Yes
AWG-15 (C8579)	1	8 in. x 4 in.		No
IMU (AN/AS 92V)	2	5 in. x 4 in.		Yes
CADC (CP1035A)	1	6 in. x 8 in.		No
Radar Alt (RCV/XMTR)	1	7 in. x 3 in.	Card ?A4	No
TACAN (RCV/XMTR)	1	5 in. x 3 in.	Converter Module 2A1, Card A1	No
D/L CV-2441B/ASW27	1	12 in. x 6 in.	Even Output on Card A6, Odd Output on Card A10	Yes

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APPENDIX A
GPMS SIGNAL LIST

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTIZATION	COMMENTS
1	SIP0300 (1/2 SINE A/C Roll & 1/2 COS A/C Roll Angle)	CSDC WRA 805	IFU WRA 461	DT04D	IFU	Periodic Serial Digital	[illegible]/Sec	[illegible]	[illegible]	LSB = $2^{-1[illegible]}$ SINE [illegible] COS ±1[illegible]	1/2 SINE A/C Roll Angle = [illegible] Bits 1/2 COS A/C Roll Angle = [illegible] Bits Source is DM AHRS [illegible] also used [illegible] coordinate transforms. See Figure [illegible].
2	SIP0301 (1/2 SINE A/C Pitch & 1/2 COS A/C Pitch Angle)	CSDC WRA 805	IFU WRA 461	DT04D	IFU	Periodic Serial Digital	[illegible]/Sec	[illegible]	[illegible]	LSB [illegible] $^{-1[illegible]}$ SINE [illegible] COS ±1[illegible]	1/2 SINE A/C Pitch Angle [illegible] 1/2 COS A/C Pitch Angle [illegible] Source is DM AHRS converted [illegible] Also used coordinate transforms. See [illegible]
3	SIP0302 (1/2 SINE A/C True HDG angle and 1/2 COS A/C True HDG Angle)	CSDC WRA 805	IFU WRA 461	DT04D	IFU	Periodic Serial Digital	1[illegible]/Sec	[illegible]	[illegible]	LSB = $^{-1[illegible]}$ SINE [illegible] COS ±1[illegible]	1/2 SINE A/C True HDG Angle = [illegible] Bits 1/2 COS A/C True HDG Angle = [illegible] Bits Source of data is DM conversion of DM [illegible] and center angle or AHRS [illegible] used in coordinate transforms. See Figure [illegible].
4	SIP0303 (A/C Pitch & Yaw Rates)	CSDC WRA 461	IFU WRA 461	DT04D	IFU	Periodic Serial Digital	[illegible]/Sec	[illegible]	[illegible]	LSB Pitch = [illegible] deg/sec LSB Yaw = [illegible] deg/sec	A/C Pitch Rate = [illegible] Bits A/C Yaw Rate = [illegible] Bits Source of data for [illegible] pitch angle. Yaw rate source [illegible] computation. See Figure [illegible] and [illegible].
5	SIP0304 (A/C Roll Rate & Press Alt Rate 1)	CSDC WRA 805	IFU WRA 461	DT04D	IFU	Periodic Serial Digital	8/Sec	[illegible]	[illegible]	LSB Roll = [illegible] deg/sec LSB Press = [illegible] fpm	A/C Roll Rate = [illegible] Bits A/C Press [illegible] Rate = [illegible] Bits Roll rate is a computation generated from DM A/C Roll Angles. A/C Press rate is reformatted data from [illegible]. See Figure [illegible].
6	SIP0305 (R/F Altitude)	CSDC WRA 805	IFU WRA 461	DT04D	IFU	Periodic Serial Digital	8/Sec	[illegible]	[illegible]	LSB [illegible] ft	Radar altitude data is reformatted [illegible] from the radar altimeter. [illegible] See Figure

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GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTIZATION	COMMENTS
7	SIP0306 (True Airspeed A & Mach #2)	CSDC WRA 805	IFU WRA 461	DT04D	IFU	Periodic Serial Digital	8/Sec	[illegible]	1[illegible]	LSB TAS = [illegible] fps LSB Mach = 0.[illegible]	True Air Speed (TAS) & Mach #[illegible] are generated in the CADC. CADC & IF[illegible] share same [illegible]. No data bus information necessary. See Figure 1
8	SIP0307 (Free Airstream Temp. & True Angle of Attack)	CSDC WRA 805	IFU WRA 461	DT04D	IFU	Periodic Serial Digital	[illegible]/Sec	[illegible]	160	LSB Temp = 0.[illegible] deg C LSB Angle = $10/2^{1[illegible]}$ deg	Free airstream temp. and true angle of attack are generated in the CADC. CADC to [illegible] does not require data bus information transfer since they share [illegible]. See Figure [illegible]
9	SIP0308 (Longitude)	CSDC WRA 805	IFU WRA 461	DT04D	IFU	Periodic Serial Digital	[illegible]/Sec	18	1[illegible]	LSB = [illegible] deg	[illegible] NAV program output, requires computation [illegible] present longitude. Does not require data bus information transfer. See Figure [illegible]
10	SIP0309 (Latitude)	CSDC WRA 805	IFU WRA 461	DT04D	IFU	Periodic Serial Digital	8/Sec	17	1[illegible]	LSB = $[illegible]/2^{[illegible]}$ deg	[illegible] NAV program output, requires computation of present latitude. Does not require data bus information transfer. See Figure [illegible]
11	SIP0310 (V_z Vert. Velocity)	CSDC WRA 805	IFU WRA 461	DT04D	IFU	Periodic Serial Digital	8/Sec	18	1[illegible]	LSB = 0.[illegible] fps	[illegible] NAV program output, computation of last vertical velocity and data bus. Transfer to [illegible]. See Figure [illegible]
12	SIP0311 (V_x Velocity Incremental Velocity)	CSDC WRA 805	IFU WRA 461	DT04D	IFU	Periodic Serial Digital	[illegible]/Sec	1[illegible]	[illegible]	LSB = [illegible] fps	[illegible] NAV program output, computation of last incremental velocity and data bus transfer to [illegible]. See Figure [illegible]
13	SIP0312 (V_y Velocity/Incremental Velocity)	CSDC WRA 805	IFU WRA 461	DT04D	IFU	Periodic Serial Digital	[illegible]/Sec	18	[illegible]	LSB = [illegible] fps	[illegible] NAV program output, computation last incremental velocity and data bus transfer [illegible]. See Figure [illegible]

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[illegible] SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	[illegible]	[illegible]	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS	QUANTIZATION	COMMENTS
14	SIP0313 (Vertical & Lift Acceleration)	CSDC WRA 805	IF[illegible] WRA 461	[illegible]		Periodic Serial Digital	[illegible]			[illegible]	[illegible] transfer [illegible]
15	SIP0400 (SINE & COS MAG HDG)	CSDC WRA 805	IF[illegible] WRA 461	DT 4[illegible]	[illegible]	Periodic Serial Digital	[illegible]/Sec		[illegible]	[illegible]	[illegible]
16	SIP0401 (Discrete Data Word)	CSDC WRA 805	IF[illegible] WRA 461	DTC4D	IF[illegible]	Periodic Serial Digital	[illegible]/Sec	[illegible]	1[illegible]		[illegible] rate [illegible] serial [illegible] [illegible] will be [illegible]
17	SIP0403 (Temperature Monitor [illegible])	CSDC WRA 805	IF[illegible] WRA 461	DTC4D	IF[illegible]	Periodic Serial Digital	[illegible]/Sec	1[illegible]	[illegible]	[illegible] 11	[illegible] converted [illegible] data [illegible] transfer [illegible] See figure [illegible]
18	SIP0402 (TACAN BRG & RNG)	CSDC WRA 805	IF[illegible] WRA 461	DTC4[illegible]	IF[illegible]	Periodic Serial Digital	[illegible]/Sec	[illegible]	1[illegible]	[illegible] LSB = [illegible] deg; RNG LSB = [illegible] n.m.	TACAN Range & Bearing are [illegible] transmitted to [illegible] and [illegible] See figure [illegible]
19	SIP04[illegible] (Wander Angle)	CSDC WRA 805	IF[illegible] WRA 461	DTC4[illegible]	IF[illegible]	Periodic Serial Digital	8/Sec	1[illegible]	1[illegible]	LSB = [illegible] deg	[illegible] NAV program output. [illegible] data bus information transfer required. See figure [illegible]
20	SIP0410 (Platform Azimuth)	CSDC WRA 805	IF[illegible] WRA 461	DTC4D	IF[illegible]	Periodic Serial Digital	[illegible]/Sec	16	14[illegible]	LSB = [illegible] deg	[illegible] synchro conversion [illegible] platform [illegible] data bus transfer [illegible] See figure [illegible]

2184-072W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTIZATION	COMMENTS
21	SIP0411 (Manual Command HDG & Manual Command Course)	CSDC WRA 805	IFU WRA 461	DT04D	IFU	Periodic Serial Digital	8/Sec	24	192	HDG LSB = $360/2^{12}$ deg CRS LSB = $360/2^{12}$ deg	MAN CMD HDG = 12 Bits MAN CMD CRS = 12 Bits DT03D conversion of 4 MEI? (DSM) analogs and transfer to DT04D. See Figure 13.
22	ADF Bearing	ADF	CSDC	ADF	DT3	3-Wire Synchro	8/Sec				Provides ADF BRG to MEI?. See Figure 13.
23	SIP0413 (Press Altitude A)	CSDC WRA 805	IFU WRA 461	DT04D	IFU	Periodic Serial Digital	8/Sec	13	104	LSB = [illegible] ft	Reformatted CADC press. altitude A. Data for information transfer is not required. See Figure [illegible].
24	SIP0414 (System Altitude)	CSDC WRA 805	IFU WRA 461	DT04D	IFU	Periodic Serial Digital	8/Sec	1[illegible]	[illegible]	LSB = [illegible] ft	DT04D NAV program output, uses IMU ΔV_z velocity and CADC press altitude. See Figure 1.
25	SIP050[illegible] (Discrete Data Word)	CSDC WRA 805	IFU WRA 461	DT04D	IFU	Periodic Serial Digital	8/Sec	8	64		Discrete packed serial data word. See Figure [illegible].
26	SIP0501 (OBC)	CSDC WRA	IFU WRA 461	DT04D	IFU	Periodic Serial Digital	8/Sec	24	[illegible]		Words 1-4 contain the 4-word [illegible] failure history. See Figure [illegible].
27	SIP050[illegible] (OBC)	CSDC WRA 805	IFU WRA 461	DT04D	IFU	Periodic Serial Digital	8/Sec	[illegible]	[illegible]		Words 1-4 contain the 4-word [illegible] failure history. See Figure 4.
28	SIP0503 (OBC)	CSDC WRA 805	IFU WRA 461	DT04D	IFU	Periodic Serial Digital	8/Sec	[illegible]	[illegible]		Words 1-4 contain the 4-word [illegible] failure history. See Figure 4.
29	SIP0504 (OBC)	CSDC WRA 805	IFU WRA 461	DT04D	IFU	Periodic Serial Digital	8/Sec	[illegible]	[illegible]		Words 1-4 contain the 4-word [illegible] failure history. See Figure 4.

2184-076W

DPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	DPMS SOURCE	DPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/ [illegible]	QUANTI-ZATION	COMMENTS
30	SIPW505 [illegible]	[illegible] WRA [illegible]	IPU WRA 461	DTC40	[illegible]	Periodic Serial Digital	[illegible]	[illegible]	[illegible]		[illegible]
31	SIP0606	VDIG WRA 811	IPU WRA 461	DTC40	[illegible]	Periodic Serial Digital	[illegible]		[illegible]		VDI [illegible]
32	SIPO[illegible]	Armament Panel ([illegible] AWG1[illegible])	[illegible] WRA 461	DTC40	[illegible]	Periodic Serial Digital	[illegible]				[illegible]
33	SIPO701	Armament Panel ([illegible] AWG1[illegible])	IPU WRA 461	DTC40	IPU	Periodic Serial Digital	[illegible]	[illegible]	[illegible]		[illegible]
34	S0P0[illegible] (Heading Correction)	IPU ([illegible])	[illegible]	[illegible]	[illegible]	Periodic Serial Digital	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
35	S0P0303 (X Velocity Corrections)	IPU (461)	[illegible]	IPU	[illegible]	Periodic Serial Digital	[illegible]		[illegible]		[illegible]
36	S0P0[illegible] (Y Velocity Corrections)	IPU (461)	[illegible]	IPU	[illegible]	Periodic Serial Digital	[illegible]		[illegible]		[illegible]
[illegible]	[illegible] ([illegible] Correction)	IPU (461)	[illegible]	[illegible]	[illegible]	Periodic Serial Digital	[illegible]		[illegible]		[illegible]

2184-075W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTIZATION	COMMENTS
38	SCP0306 (Y Tilt Corr)	[illegible] (461)	CSDC (806)	[illegible]	[illegible]	Periodic Serial Digital	[illegible]		[illegible]		[illegible] calculations See figure [illegible]
39	S[illegible]P0309 ([illegible] Azimuth Corr)	[illegible] (461)	CSDC [illegible]	[illegible]	[illegible]	Periodic Serial Digital	[illegible]				[illegible] calculations See figure [illegible]
[illegible]	S[illegible] ([illegible]S Azimuth Corr)	[illegible] (461)	CSDC [illegible]	[illegible]	[illegible]	Periodic Serial Digital	[illegible]				[illegible]
[illegible]	S[illegible] (X Gyro Bias Corr)	[illegible] (461)	CSDC [illegible]	[illegible]	[illegible]	Periodic Serial Digital	[illegible]		1		[illegible]
[illegible]	S[illegible] ([illegible] Gyro Bias Corr)	[illegible] (461)	CSDC [illegible]	[illegible]	[illegible]	Periodic Serial Digital	[illegible]				[illegible]
43	SCP[illegible]11 (Z Gyro Bias Corr)	[illegible] (461)	CSDC [illegible]	[illegible]	[illegible]	Periodic Serial Digital	[illegible]		[illegible]		[illegible]
[illegible]	SCP[illegible] (Discrete Data Words)	[illegible] (461)	CSDC [illegible]	[illegible]	[illegible]	Periodic Serial Digital	[illegible]	1	1		[illegible]
[illegible]	[illegible] (Delta Wander Angle)	[illegible] (461)	CSDC [illegible]	[illegible]	[illegible]	Periodic Serial Digital	[illegible]				[illegible]
46	SCP0400 (Ground Track Mag)	[illegible] (461)	CSDC (806)	[illegible]	[illegible]	Periodic Serial Digital	[illegible]	[illegible]		[illegible]	[illegible]
47	S[illegible]P0402 (Ground Speed)	[illegible] (461)	CSDC [illegible]	[illegible]	[illegible]	Periodic Serial Digital	[illegible]	1	[illegible]	[illegible]	[illegible]

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GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTIZATION	COMMENTS
48	[illegible]P0403 (Wind Direction & Speed)	IF[illegible] ([illegible]61)	CSDC ([illegible])	IFU	PT04[illegible]	Periodic Serial Digital	[illegible]	[illegible]	[illegible]	[illegible] deg [illegible] kt	[illegible] are [illegible] transmitted [illegible] See Figure [illegible]
49	[illegible]P04[illegible] (MDIG CMD HDG REL & CMD CPS REL)	IF[illegible] ([illegible])	CSDC (805)	IF[illegible]	PT0[illegible]	Periodic Serial Digital	[illegible]	[illegible]	[illegible]	[illegible] deg	[illegible] are [illegible] formatted and transmitted [illegible] See Figure [illegible]
50	[illegible]P0405 ([illegible] CMD HDG REL & MDIG RANGE TO DESTINATION)	I[illegible] [illegible]61	CSDC ([illegible])	IF[illegible]	[illegible]	Periodic Serial Digital	[illegible]	[illegible]	[illegible]	[illegible] deg	[illegible] is retransmitted [illegible] is retransmitted [illegible] See Figures [illegible]
51	[illegible] (Delta Longitude)	I[illegible] ([illegible]61)	CSDC ([illegible])	[illegible]	[illegible]	Periodic Serial Digital	[illegible]	[illegible]	[illegible]		See Figure [illegible]
5[illegible]	[illegible] (Pulse Doppler Mode)	IF[illegible] ([illegible]61)	CSDC ([illegible])	IF[illegible]	PT04[illegible]	Periodic Serial Digital	[illegible]	[illegible]			Pulse Doppler Mode [illegible] See Figure [illegible]
[illegible]	[illegible] (Delta Latitude)	I[illegible] ([illegible]61)	CSDC ([illegible])	IF[illegible]	[illegible]	Periodic Serial Digital	[illegible]		[illegible]		See Figure [illegible]
54	[illegible] (Back up MAG HDG)	I[illegible] ([illegible]61)	CSDC ([illegible])	IF[illegible]	[illegible]	Periodic Serial Digital	[illegible]	[illegible]	[illegible]	[illegible] deg	[illegible] See Figure [illegible]
[illegible]	[illegible]P0415 ([illegible] Symbol Word)	IF[illegible] ([illegible]61)	CSDC ([illegible])	IF[illegible] ([illegible]61)	[illegible]	Periodic Serial Digital	[illegible]	[illegible]	[illegible]		[illegible] are [illegible] formatted and transmitted [illegible] See Figure [illegible]
[illegible]	[illegible] ([illegible])	I[illegible] ([illegible]61)	CSDC (80[illegible])	[illegible]	[illegible]	Periodic Serial Digital	[illegible]	1[illegible]	[illegible]		[illegible] See Figure [illegible]
[illegible]	[illegible]	IF (461)	[illegible] Converter [illegible]	IF[illegible] (461)	[illegible]	Periodic Serial Digital	[illegible]		[illegible]		Target [illegible] Elevation Data for [illegible] See Figure [illegible]

2184-079W

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/ SEC	QUANTI- ZATION	COMMENTS
58	SOP0601	IFU (461)	VDIG ADI Converter (811)	IFU (461)	DT04D	Periodic Serial Digital	32/Sec	20	640		Azimuth and elevation steering data for HUD Display. See Figure 9.
59	SOP0602	IFU (461)	VDIG Converter (WRA 811)	IFU	DT04D	Periodic Serial Digital	32/Sec	[illegible]	704		Range bar azimuth and target range for VDI Display. See Figure 9.
60	SOP0603	IFU (461)	VDIG Converter (811)	IFU (461)	DT04D	Periodic Serial Digital	8/Sec	14	112		Closure rate and range scale data for HUD Display. See Figure 9.
61	SOP0604	IFU (461)	VDIG Converter (811)	IFU (461)	DT04D	Periodic Serial Digital	8/Sec	22	176		Max range data for VDIG Display. See Figure 9.
62	SOP0605	IFU (461)	VDIG Converter (811)	IFU (461)	DT04D	Periodic Serial Digital	32/Sec	19	608		Bomb impact data for VDIG Display. See Figure 9.
63	SOP0606	IFU (461)	VDIG Converter (811)	IFU (461)	DT04D	Periodic Serial Digital	32/Sec	23	736		Bomb impact angle data for VDIG Display. See Figure 9.
64	SOP0607	IFU (461)	VDIG Converter (811)	IFU (461)	DT04D	Periodic Serial Digital	8/Sec	9	72		Allowable steering error data for VDIG Display. See Figure 9
65	SOP0608	IFU (461)	VDIG Converter (811)	IFU (461)	DT04D	Periodic Serial Digital	32/Sec	21	672		Azimuth and elevation steering command data for VDI Display. See Figure 9.
66	SOP0609	IFU (461)	VDIG Converter (811)	IFU (461)	DT04D	Periodic Serial Digital	32/Sec	19	608		Velocity vector position azimuth and elevation data for VDIG Display. See Figure 9.
67	SOP0610	IFU (461)	VDIG Converter (811)	IFU (461)	DT04D	Periodic Serial Digital	8/Sec	19	152		Lower resolution cue azimuth and elevation data for VDI. See Figure 9.
68	SOP0611	IFU (461)	VDIG Converter (811)	IFU (461)	DT04D	Periodic Serial Digital	8/Sec	19	152		Upper resolution cue azimuth and elevation data for VDIG Display. See Figure 9.
69	SOP061[illegible]	IFU (461)	VDIG Converter (811)	IFU (461)	DT04D	Periodic Serial Digital	8/Sec	19	1[illegible]		[illegible] azimuth and elevation cue data for [illegible]. See Figure 9.

2184-078W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GIMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/ SEC	QUANTI- ZATION	COMMENTS
70	SOP0700	IFU (461)	CIACS (804) ARMAMENT PANEL	IFU (461)	DT04D	Periodic Serial Digital	[illegible]/Sec	[illegible]	[illegible]		[illegible] station selection data. See Figure [illegible].
71	SOP0701	IFU (461)	CIACS (804)	IFU (461)	DT04D	Periodic Serial Digital	8/Sec	1[illegible]	1[illegible]		AIM-[illegible] ready and tuning data. See Figure [illegible].
72	Code [illegible] Word (Pres. Alt. Rate 1)	CADC (CP1035A)	CSDC (805)	CADC	DT04D	Periodic Serial Digital	[illegible]/Sec	[illegible]	[illegible]	LSB = [illegible] fpm	CADC pressure altitude Rate 1 is reformatted for transmission to the [illegible]. See Figure [illegible].
73	Code 1 Word (Pres. Alt. A)	CADC (CP1035A)	CSDC ([illegible])	CADC	DT04D	Periodic Serial Digital	[illegible]/Sec	1[illegible]	[illegible]	LSB = [illegible] ft	CADC Pres. Alt. A is reformatted for transmission to the IFU in [illegible]. See Figure 1.
74	Code 3 Word (True Airspeed A)	CADC (CP1035A)	CSDC (805)	CADC	DT04D	Periodic Serial Digital	[illegible]/Sec	11	[illegible]	LSB = [illegible] fps	CADC True Airspeed A is reformatted for transmission to the IFU in [illegible]. No data [illegible] information transfer required. See Figure 1.
75	Code 14 Word (Mach #1)	CADC (CP1035A)	CSDC ([illegible])	CADC	DT04D	Periodic Serial Digital	[illegible]/Sec	1	[illegible]	LSB = [illegible]	CADC Mach #1 issued [illegible] to generate [illegible] corrected airspeed error and [illegible]. See Figure [illegible].
76	Code [illegible] Word (True Angle of Attack)	CADC (CP1035A)	CSDC (805)	CADC	DT04D	Periodic Serial Digital	[illegible]/Sec	11	[illegible]	LSB = [illegible] deg	CADC true angle of attack is retransmitted to the [illegible]) and to the [illegible], requires [illegible] to [illegible] data transfer. See Figure 3.
77	Code [illegible] Word (Free Airstream Temp)	CADC (CP1035A)	CSDC (805)	CADC	DT04D	Periodic Serial Digital	[illegible]/Sec	[illegible]	1[illegible]	LSB = [illegible]	CADC free airstream temp is retransmitted to [illegible]. See Figure 3.
78	Code [illegible] Word (Pres. Alt. Rate #[illegible])	CADC (CP1035A)	CSDC (805)	CADC	DT04D	Periodic Serial Digital	[illegible]/Sec	[illegible]	1[illegible]	LSB = [illegible] fpm	CADC pres. alt. rate [illegible] is transmitted to [illegible]. See Figure [illegible].
79	Code 11 Word (Pres. Alt. [illegible])	CADC (CP1035A)	CSDC (805)	CADC	DT04D	Periodic Serial Digital	[illegible]/Sec	1	[illegible]	LSB = [illegible] ft	CADC pres. alt. [illegible] is transmitted to the [illegible] and used to generate the [illegible] error which is output to the [illegible]. See Figures [illegible] and 1.

2184-080W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTI-ZATION	COMMENTS
80	Code 12 Word (Pres. Alt. C)	CADC (CP1035A)	CSDC (805)	CADC	DT04D	Periodic Serial Digital	20/Sec	10	200	LSB = 1?5 ft	CADC pres. alt. C is retransmitted to the Data Link and VDIG (DT03D) and used to generate CMD ALT error which is output to the VTI?. See Figure 6.
81	Code 13 Word (True Airspeed B)	CADC (CP1035A)	CSDC (805)	CADC	DT04D	Periodic Serial Digital	20/Sec	11	220	LSB = 3600/2^{11} kts	CADC true airspeed B is retransmitted to the MDIG and Data Link (DT03D). See Figure 7.
82	Code 4 Word (Mach #2)	CADC (SP1035A)	CSDC (805)	CADC	DT04D	Periodic Serial Digital	20/Sec	11	220	LSB = 0.00? M	CADC Mach #2 is retransmitted to the IF? (SIF ?30?), data bus information transfer is not required. See Figure ?.
83	Code 15 Word (Indicated Airspeed)	CADC (CP1035A)	CSDC (805)	CADC (04D)	DT04D	Periodic Serial Digital	20/Sec	10	200	LSB = 900/2$^{1?}$ kts	CADC indicated airspeed is transmitted to DT03D for command airspeed error computation for VTI?. See Figure 2.
84	Address Code 1 (Range)	TACAN (APN-84)	CSDC (805)	TACAN	DT01D	Periodic Serial Digital	?0/Sec	16	320	LSB = 0.005 n.m.	TACAN range is transmitted to DT04D (IF?) and to DT03D (MDIG). See Figure 1?.
85	Address Code 0 (Bearing)	TACAN (APN-84)	CSDC (805)	TACAN	DT01D	Periodic Serial Digital	?0/Sec	16	320	LSB = 0.?5 deg	TACAN bearing is transmitted to the DT03D for relative TACAN bearing and TACAN deviation and to DT04D for use by the IF?. See Figure 10.
86	Radar Altitude	Radar Alt-imeter (APN-194)	CSDC (805)	Radar Alt-imeter	DT01D	Periodic Serial Digital	??/Sec	1?	260	LSB = 1 ft	Radar Altitude is transmitted to DT03D (? ?) and to DT04D (IF?). See Figure 6.
87	Address Code 0 (Mag. Hdg.)	CSDC (805)	MDIG	DT03D	MDIG	Periodic Serial Digital	10/Sec	11	110	LSB = 360/2$^{1?}$ deg	Source of Mag. Hdg. to DT03D is DT0?D (AHRS). See Figure 11.
88	Address Code 2 (Ground Speed)	CSDC (805)	MDIG	DT03D	MDIG	Periodic Serial Digital	10/Sec	1?	1?0	LSB = 3600/2$^{1?}$ kts	Source of ground speed to DT03D is DT0? (? ?). See Figure 1?.
89	Address Code 3 (Wind Direction & Speed)	CSDC (805)	MDIG	DT03D	MDIG	Periodic Serial Digital	10/Sec	18	180	Dir. LSB = 360/2^{9} deg SPD LSB = 1 kt.	Source of wind direction and speed to DT0?? is DT04D (IF?). See Figure ?

2184-082W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTIZATION	COMMENTS
90	Address Code 4 (MDIG CMD HDG REL & CMD CRS REL)	CSDC (805)	MDIG	DTO3D	MDIG	Periodic Serial Digital	10/Sec	23	230	HDG LSB = $360/2^{11}$ deg CRS LSB = 360/[illegible] deg	Source of command heading and command course reliable to DTO3D (MDIG) is [illegible]. See Figure 1.
91	Address Code 5 (Range to Dest.)	CSDC (805)	MDIG	DTO3D	MDIG	Periodic Serial Digital	10/Sec	13	130	LSB = 0.5 n.m.	Source of range to destination to DTO3D (MDIG) is DTO4D (IFU) [illegible]. See Figure 1.
92	Address Code 6 (True Airspeed B)	CSDC (805)	MDIG	DTO3D	MDIG	Periodic Serial Digital	10/Sec	7	110	LSB = $3600/2^{11}$ kts	Source of true airspeed B to DTO3D (MDIG) is DT4D (CADC). See Figure 7.
93	Address Code 7 (TACAN Deviation & ADF Bearing)	CSDC (805)	MDIG	DTO3D	MDIG	Periodic Serial Digital	10/Sec	19	190	DEV LSB = $22.5/2^{9}$ deg BRG LSB = $360/2^{10}$ deg	TACAN deviation is generated in DTO3D from TACAN bearing angle and MDIG manual command course. ADF bearing is a synchro from the ADF which is converted to digital in the DTO3D. TACAN Dev = 9 Bits ADF BRG = 10 Bits See Figure [illegible] & 13.
94	Address Code 8 (REL TACAN BRG & TACAN RANGE)	CSDC (805)	MDIG	DTO3D	MDIG	Periodic Serial Digital	10/Sec	23	230	BRG LSB = $360/2^{11}$ deg RNG LSB = 0.1 n.m.	Relative TACAN bearing is computed in DTO3D from TACAN bearing [illegible]. TACAN range is transmitted to DTO3D from DTO1D. TACAN RNG = 12 Bits REL TACAN BRG = 11 Bits See Figure [illegible].
95	Address Code 15 (ABC Symbol Word)	CSDC (805)	MDIG	DTO3D	MDIG	Periodic Serial Digital	10/Sec	24	240		[illegible] Symbol word originates in the IFU [illegible] = 4 - 6 Bit words. See Figure 1.

2184-081W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTIZATION	COMMENTS
96	Address Code 0 (CMD Airspeed Error & ILS Vertical Error)	CSDC (805)	VDIG	DTO3D	VDIG	Periodic Serial Digital	10/Sec	16	160	A/S LSB = $900/2^7$ kts VERT LSB = $1.4/2^7$ deg	Command Airspeed error is computed in the DTO3D. ILS vertical error is a DC analog signal from the ILS receiver to the DTI where it is digitized. CMD A/S Error = 8 Bits ILS Vert Error = 8 Bits See Figures 2 & 13.
97	Address Code 1 (ILS Lateral Error)	CSDC (805)	VDIG	DTO3D	VDIG	Periodic Serial Digital	10/Sec	8	80	LSB = $6/2^7$ deg	ILS lateral error is a DC analog signal from the ILS receiver to the CSDC where it is digitized. See Figure 13.
98	Address Code 2 (Time to Go & Reticle Manual Elevation)	CSDC (805)	VDIG	DTO3D	VDIG	Periodic Serial Digital	10/Sec	15	150	TTG LSB = 0.5 sec ELEV LSB = $20/2^9$ deg	Time to Go (TTG) is serial digital data from the data link (DTO3D) which is reformatted for transmission to the VDIG (DTO3D). Reticle manual elevation (elevation lead angle) is a DC analog from CIACS (AWG-15) digitized in the DTO3D for transmission to the VDIG. TTG = 6 Bits ELEV = 9 Bits See Figures 13 & 14.
99	Address Code 3 (TACAN Deviation & True Angle of Attack)	CSDC (805)	VDIG	DTO3D	VDIG	Periodic Serial Digital	10/Sec	[illegible]	[illegible]00	DEV LSB = [illegible] deg TAT LSB = [illegible] deg	TACAN deviation (9 Bits) is generated in [illegible] from TACAN bearing and [illegible] manual command course. True angle of attack (11 Bits) is generated in the CADC ([illegible]) and transmitted to [illegible]. See Figures [illegible].
100	Address Code 4 (Vertical Glide Error/Vertical Error)	CSDC (805)	VDIG	DTO3D	VDIG	Periodic Serial Digital	10/Sec	[illegible]	60	LSP = [illegible] ft	Vertical [illegible] error is reformatted [illegible] data. See Figure 13.

2184-083W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/ SEC	QUANTI- ZATION	COMMENTS
101	Address Code 5 (V[illegible] CMD [illegible]DG REL)	CSDC (805)	VDIG	DTO3D	VDIG	Periodic Serial Digital	10/Sec	11	11[illegible]	LSB = $360/2^{11}$ deg	Source of [illegible] command heading [illegible] the [illegible] DTO4[illegible] See Figure 1[illegible].
102	Address Code 6 Press Alt Rate -2)	CSDC (805)	VDIG	DTO3D	VDIG	Periodic Serial Digital	10/Sec	9	90	LSB = [illegible]$/2^{8}$ fpm	Source of press altitude rate - [illegible] is the CADC ([illegible]TO4). See Figure [illegible].
10[illegible]	Address Code 7 (SINE A/C Roll & COS A/C Roll)	CSDC (805)	VDIG	DTO3D	VDIG	Periodic Serial Digital	10/Sec	2[illegible]	[illegible]	SINE LSB = $180/2^{1[illegible]}$ deg COS LSB = $180/2^{10}$ deg	Source of SINE and [illegible] roll is a [illegible] wire synchro from the IM[illegible], a [illegible] analog of this signal is sent to the IF[illegible], digital is sent to the [illegible] and the [illegible]. SINE A/C ROLL = 11 Bits COS A/C ROLL = 11 Bits See Figure 1[illegible].
104	Address Code 8 (Pres. Alt -[illegible] & [illegible] ALT)	CSDC (805)	VDIG	[illegible]	VDIG	Periodic Serial Digital	10/Sec	[illegible]1	[illegible]	PRES LSB = 1[illegible] ft RDR LSB = $5000/[illegible]^{11}$ ft	Source of pressure altitude -[illegible] is the [illegible] (Code [illegible] Word) source of radar altitude is the radar altimeter. PRES ALT -[illegible] = 1[illegible] Bits RDR ALT = 11 Bits See Figure [illegible].
105	Address Code [illegible] (CMD ALT Error & Scale Change)	CSDC (805)	VD[illegible]	DTO3D	VDIG	Periodic Serial Digital	10/Sec	9	9[illegible]	LSB = 1[illegible] or 10[illegible] ft.	Source is a CSDC computation using data [illegible] (CMD ALT) and CADC (PRES ALT) data. [illegible] ALT ERROR = [illegible] Bits SCALE [illegible] = 1 [illegible] See Figure [illegible].
106	Address Code 10 (Lateral Glide Slope Error/Lateral Error)	CSDC ([illegible]05)	VDIG	DTO3D	[illegible]	Periodic Serial Digital	10/Sec	[illegible]	[illegible]	[illegible] LSB = [illegible] deg	LAT [illegible] is from the [illegible]. See Figure 1[illegible].
1[illegible]7	Address Code 11 (A/C Pitch and CMD Airspeed)	CSDC ([illegible])	VD[illegible]	DTO3D	[illegible]	Periodic Serial Digital	10/Sec	1[illegible]	[illegible]	PITCH LSB = 1[illegible] deg [illegible] LSB = [illegible] MACH	A/C [illegible] (11 Bits) is a conversion of IM[illegible] data. CMD airspeed ([illegible] Bits) is from the [illegible]. [illegible] does not require data [illegible] information transfer. See Figures [illegible] & 1[illegible].

2184-085W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTI-ZATION	COMMENTS
108	Address Code 12 (MAG HDG & CMD ALT)	CSDC (805)	VDIG	DTC3D	VDIG	Periodic Serial Digital	10/Sec	18	180	HDG LSB = $360/2^{11}$ deg ALT = 100 or 1000 ft.	Magnetic heading (11 Bits) is from the AHRS or [illegible]. Command altitude (7 Bits) is from the D/L. See Figures 11 & 6.
109	Address Code 13 (Discrete Data)	CSDC (805)	VDIG	DTO3D	VDIG	Periodic Serial Digital	10/Sec	13	130		D/L, NAV computations and [illegible] discrete control data. See Figure 25.
110	IMU CALIBRATION DATA	IMU (AS-92V)	CSDC (805)	IMU	DTC1D	Aperiodic Serial Digital	8/Sec	21	168		IMU calibration data (ID Code = [illegible] Bits, DATA = 1[illegible] Bits) is transmitted to the [illegible] where it is reformatted and stored for NAV computations. See Figure [illegible].
111	D/L MESSAGE 3 (A/C VECTORING)	D/L (ASW-27B)	CSDC (805)	D/L	DTO3D	Aperiodic Serial Digital	16/Sec	[illegible]	67[illegible]		Message is D/L dependent. a. CMD HDG = 8 Bits (LSB = [illegible]) deg b. CMD ALT = 7 Bits (LSB = 100 or 1000 ft) c. ALT SCALE CHANGE = 1 Bit d. CMD SPD = 6 Bits (LSB = [illegible] M) e. DISCRETE MESSAGES = [illegible] Bits See Figures [illegible], 6 & 17.
112	D/L MESSAGE 5 (Traffic Control)	D/L (ASW-27B)	CSDC (805)	D/L	DTO3D	Aperiodic Serial Digital	16/Sec	42	672		Message is D/L dependent. a. CMD HDG to MAG. N. = 8 Bits (LSB = [illegible] deg) b. CMD ALT = 7 Bits (LSB = 100 or 1000 ft) c. ALT SCALE CHANGE = 1 Bit d. CMD SPD = 6 Bits (LSB = [illegible] kts) e. DISCRETE MESSAGES = 4 Bits See Figures [illegible], 6 & 17.
113	D/L MESSAGE 6 (ACL Control)	D/L (ASW-27B)	CSDC (805)	D/L	DTO3D	Aperiodic Serial Digital	16/Sec	15	240		Data link dependent. a. VERT GLIDE SLOPE ERR = [illegible] Bits (LSB = [illegible] or [illegible] ft.) b. WAVE OFF = 1 Bit c. LAT GLIDE SLOPE ERR = [illegible] Bits (LSB = [illegible] or 1000 [illegible]) d. A[illegible] = 1 Bit See Figure 1[illegible].

2184-084W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTI-ZATION	COMMENTS
114	D/L MESSAGE 18 (A/P Control)	D/L (ASW-27B)	CSDC (805)	D/L	DT03D	Aperiodic Serial Digital	16/Sec	14	224		D/L dependent - a. VERT ERROR = [illegible] Bits b. LAT ERROR = [illegible] Bits c. AUTOPILOT = 1 Bit See Figure 1[illegible]
115	D/L MESSAGE 19 ([illegible] Control)	D/L (ASW-27B)	CSDC (805)	D/L	DT03D	Aperiodic Serial Digital	16/Sec	32	512		D/L dependent - a. CMD HDG to MAG. N. = [illegible] Bits ([illegible] = 360 [illegible] 8 deg) b. CMD ALT = 7 Bits ([illegible] or [illegible] ft) c. ALT SCALE = 1 Bit d. CMD SPD = 6 Bits (LSB = [illegible] kts) e. TTG = 6 Bits ([illegible] sec) f. DISCRETE MESSAGES = 4 Bits See Figures [illegible], [illegible], 1[illegible] & 17.
116	D/L MESSAGE 10 (Control Test EVEN MSG)	D/L (ASW-27B)	CSDC (805)	D/L	DT03D	Aperiodic Serial Digital	16/Sec	10	160		D/L dependent used in [illegible] D/L Status - a. VERT [illegible] = 6 Bits b. LAT [illegible] = [illegible] Bits See Figure 1[illegible].
117	D/L MESSAGE 21 (Control Test ODD MSG)	D/L (ASW-27B)	CSDC (805)	D/L	DT03D	Aperiodic Serial Digital	16/Sec	24	384		D/L dependent, used in ORC D/L Status - a. CMD HDG = 8 Bits b. ALT SCALE = 1 Bit c. CMD SPD = 6 Bits d. TTG = 6 Bits e. DISCRETE MESSAGES [illegible] See Figures [illegible], 6, 13 & 17
118	D/L REPLY (MESSAGE R-0)	CSDC (805)	D/L (ASW-27B)	DT03D	D/L	Aperiodic Serial Digital	16/Sec	32	512		D/L dependent - a. GND TRACK = 6 Bits (relative MAG. N.) b. WEAPON STATUS = 4 Bits (useable missiles) c. A/C ALT = 7 Bits (MSB = [illegible] ft.) d. SCALE CHANGE = 1 Bit e. A/C TYPE = 3 Bits f. FUEL = 6 Bits (LSB = 400 lbs.) g. TRUE A.S. = 6 Bits (LSB = 3600/2⁸ kts) See Figures 6, 7, 17 & [illegible]. Time dependent on receipt of D/L update discrete.

2184-086W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTIZATION	COMMENTS
11[illegible]	A/C PITCH ANGLE	CSDC (805)	IFU (461)	DTO4D	IFU	DC Analog				6°/VOLT +10V = $+60^{\circ}$ -10V = -60°	Signal sources for this analog are the IMU or AHRS pitch synchros; this information comes from DTO1D and DTO2D. See Figure 16.
120	TEMP MONITOR C	IMU	CSDC	IMU	DTO1D	DC Analog				1/Sec	DTO1D A/D and transmission to DTO4D (SIPO[illegible]) to IFU. See Figure 21.
121	LIFT ACCELERATION	ADC Normal Accelerometer	CSDC	Normal Accelerometer	DTO4D	DC Analog				[illegible]0/Sec	DTO4D A/D and transmitted to IF[illegible] in SIP[illegible]. See Figure 21.
12[illegible]	A/C ROLL ANGLE	CSDC (805)	IFU (461)	DTO4D	IFU	DC Analog				± 10V ± 80° [illegible]$^{\circ}$/VOLT	Signal sources for this analog are the IM[illegible] and AHRS roll synchros. the DTO1[illegible] and DTO2D performs synchro to digital and transmission to DTO4D. See Figure 1[illegible].
1[illegible]3	SINE MANUAL CMD HDG	HSD (D/O MDIG)	CSDC (805)	MDIG	DTO3D	DC Analog	20/Sec			± 10 VDC 5k OHM POT	Used to generate digital manual CMD HDG (SIPO411) to IFU. Requires DTO3D to DTO4D data transfer. See Figure [illegible]
124	C[illegible]S MANUAL CMD HDG	HSD (P/C MDIG)	CSDC (805)	MDIG	DTO3D	DC Analog	20/Sec			± 10 VDC 5k OHM POT	Used to generate digital manual CMD HDG (SIPO411) to IF[illegible]. Requires DT[illegible] to DTO4D data transfer. See Figure [illegible].
1[illegible]5	SINE MANUAL CMD CRS	HSD (P/O MDIG)	CSDC (805)	MDIG	DTO3D	DC Analog	[illegible]0/Sec			± 10 VDC 5k OHM POT	Used to generate manual CMD CRS (SIPO411) to IFU and TACAN deviation to V[illegible] and MDIG. See Figures [illegible] and 1[illegible].
1[illegible]6	COS MANUAL CMD CRS	HSD (P/O MDIG)	CSDC (805)	MDIG	DTO3D	DC Analog	[illegible]/Sec			± 10 VDC 5k OHM POT	Used to generate digital manual CMD CRS (SIPO411) to IFU and TACAN deviation to V[illegible] and MD[illegible]. See Figures 3 and 1[illegible].

2184-088W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTI-ZATION	COMMENTS
127	ATTITUDE REFERENCE MODE	CSDC (805)	IMU (AS-92V)	DT01D	IMU	Discrete				1 = ATT REF MODE	Signal is generated from IF [illegible] function code. See Figure 22.
128	NAVIGATE/ALIGN MODE	CSDC (805)	IMU (AS-92V)	DT01D	IMU	Discrete				1 = NAVIGATE	Signal is generated from IF [illegible] function code. See Figure [illegible].
129	IMU FLAG SET	CSDC (805)	IMU (AS-92V)	DT01D	IMU	Discrete				1 = FLAG SET	Signal is generated from [illegible] discrete word. See Figure [illegible].
130	IMU FLAG RESET	CSDC (805)	IMU (AS-92V)	DT01D	IMU	Discrete				1 = FLAG SET	Signal is generated from IF [illegible] discrete word. See Figure 2[illegible].
131	X GYRO TORQUE	CSDC (805)	IMU (AS-92V)	DT01D	IMU	Pulse	300 PPS MAX				Signal is generated from [illegible] to [illegible] 11. See Figure [illegible].
132	$\overline{X}$ GYRO TORQUE	CSDC (805)	IMU (AS-92V)	DT01D	IMU	Pulse	300 PPS MAX				Signal is generated from AMCS IFU serial inputs to DT04D,SOP0303 to SOP0304. See Figure [illegible].
133	Y GYRO TORQUE	CSDC (805)	IMU (AS-92V)	DT01D	IMU	Pulse	300 PPS MAX				Signal is generated from AMCS IFU serial inputs to DT04D,SOP0303 to SOP0311. See Figure [illegible].
134	$\overline{Y}$ GYRO TORQUE	CSDC (805)	IMU (AS-92V)	DT01D	IMU	Pulse	300 PPS MAX				Signal is generated from IFU serial inputs to DT04D,SOP0303 to SOP0311. See Figure [illegible].
135	Z GYRO TORQUE	CSDC (805)	IMU (AS-92V)	DT01D	IMU	Pulse	300 PPS MAX				Signal is generated from IFU serial inputs to DT04D,SOP0303 to SOP0311. See Figure 24.

2184-089W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTIZATION	COMMENTS
136	Z GYRO TORQUE	CSDC (805)	IMU (AS-92V)	DT01D	IMU	Pulse	300 PPS MAX				Signal is generated from IFU serial inputs to DT04D, SOP0303 to SOP0311. See Figure 24.
137	IMU READY	IMU (AS-92V)	CSDC (805)	DT01D	IMU	Discrete				0 = READY	Signal is transmitted to the IFU in serial data word SIP0401 from DT04D. See Figure [illegible].
138	IMU FAIL	IMU (AS-92V)	CSDC (805)	IMU	DT01D	Discrete				0 = FAIL	Signal is transmitted to AMCS/IFU in serial data word SIP0401 from DT04D (See Figures 15, 19 & [illegible]) used in display mode switching logic.
139	ACCELEROMETER COARSE HEATER ON	IMU (AS-92V)	CSDC (805)	IMU	DT01	Discrete				[illegible]	Signal is transmitted to IFU in serial data word SIP0401 from DT04D. See Figure [illegible].
140	GYRO COARSE HEATER ON	IMU (AS-92V)	CSDC (805)	IMU	DT01D	Discrete				[illegible]	Signal is transmitted to the IFU in serial data word SIP0401. See [illegible]
141	GYRO FLOAT TEMP UP	IMU (AS-92V)	CSDC (805)	IMU	DT01D	Discrete				[illegible]	Signal is transmitted to the IFU in serial data [illegible] See [illegible]
142	ROLL ANGLE SYNCHRO	IMU (AS-92V)	CSDC (805)	IMU	DT01D	3 Wire Sync	800/Sec			[illegible] 0 to [illegible] VA	Signal [illegible] digital [illegible] DT01D [illegible] transferred [illegible] INS mode [illegible] 11 [illegible] AT [illegible] d. [illegible] See Figure

2184-087W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMF SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTIZATION	COMMENTS
143	PITCH ANGLE SYNCHRO	IMU (AS-92V)	CSDC (805)	IMU	DTO1D	3 Wire Sync	8 [illegible]/Sec			± [illegible]° 0 to 11.8 VAC	Signal is converted to digital and [illegible] anal[illegible] in [illegible] and transferred when [illegible] Mode to: a. [illegible] (A[illegible] PITCH b. [illegible] SIN[illegible] PITCH ANGLE - [illegible], A[illegible] PITCH RATE - SIP[illegible] PITCH ANGLE ANAL[illegible] c. COORD TRANSFORMS See Figure [illegible].
144	PLATFORM HDG RSLVR - x1	IMU (AS-92V)	CSDC (805)	IMU	DTO1D	4 Wire Sync Resolver				0 to 36[illegible]°, 0 to 12 VAC 1 deg/deg	Signal is converted to digital and combined with x8 and used for the following: a. $\dot{\psi}$ SINE & $\dot{\psi}$ COS TRUE [illegible] ANGLE - SIP[illegible] b. A/C YAW RATE - SIP[illegible] c. PLATFORM AZIMUTH - SIP[illegible] See Figure 1[illegible].
145	PLATFORM HDG RSLVR - x8	IMU (AS-92V)	CSDC (805)	IMU	DTO1D	4 Wire Sync Resolver				0 to 360°, 0 to 1[illegible] VAC, 8 deg/deg	Signal is converted to digital and combined with x1 and used for the following: a. $\dot{\psi}$ SINE & $\dot{\psi}$ COS [illegible] ANGLE - SIP[illegible] b. A[illegible] YAW RATE - [illegible] c. PLATFORM AZIMUTH - [illegible] See Figure 1[illegible].
146	± V_x VELOCITY PULSES	IMU (AS-92V)	CSDC (805)	IMU	DTO1D	4 Wires - Pulses				[illegible] to [illegible] FPS	Used to compute V_x velocity incremental velocity and transferred to [illegible] 11. See Figure [illegible].
147	± V_z VELOCITY PULSES	IMU (AS-92V)	CSDC (505)	IMU	DTO1D	4 Wires - Pulses				[illegible] to [illegible] FPS	Used in [illegible] to compute V_y velocity incremental velocity and transferred to [illegible] for [illegible] (SIP[illegible]). See Figure [illegible].
148	± V_z VELOCITY PULSES	IMU (AS-92V)	CSDC (805)	IMU	DTO1D	4 Wires - Pulses				[illegible] to [illegible] FPS	Used to compute the following [illegible] data: a. V_z VERT [illegible] - SIP[illegible] b. VERT ALTITUDE - SIP[illegible] c. [illegible] ALTITUDE - SIP[illegible] See Figures [illegible].

2184-091W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/ SEC	QUANTI- ZATION	COMMENTS
149	STEERING ERROR	CSDC (805)	AFCS (Roll Computer)	DTO3D	AFCS	D/C Analog	8/Sec			± 10 VDC 1.125 deg/V	Steering error is computed using: a. Clutched MAG HDG when MAG HDG ENGAGE signal from AFCS is present, or b. Clutched GROUND TRACK when GRD TRK ENGAGE signal from AFCS is present, or c. [illegible] CMD HDG and the actual ground track (MAG) when CMD HDG ENGAGE from AFCS is present. See Figure 17.
150	STEERING ERROR RELIABLE	CSDC (805)	AFCS (Roll Computer)	DTO3D	AFCS	Discrete				[illegible]	Used to inform the AFCS of the validity of the Analog steering error signal. [illegible] AHRS HDG SYNCHRO A/D fail • [illegible] steering error D/A fail • AHRS COMPASS MODE • (clutched GRD TRACK engaged • AHRS fail • IMU fail) • (clutched CMD HDG engaged • (vector valid not • IMU fail)) See Figure 17.
151	AFCS VALID - ACL	CSDC (805)	AFCS (Pitch Computer)	DTO3D	AFCS	Discrete					DTO3D generated signal from [illegible] message ACL VALID = [illegible] • ACL [illegible] MESSAGE [illegible] [illegible] [illegible] See Figure 17.
152	AFCS VALID - PCD	CSDC (805)	AFCS (Pitch Computer)	DTO3D	AFCS	Discrete					DTO3D generated signal from [illegible] message PCD VALID = [illegible] • [illegible] • [illegible] • [illegible] [illegible] See Figure 17.

2184-092W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTI-ZATION	COMMENTS
153	AFCS VALID - VECTOR	CSDC (805)	AFCS (Pitch Computer)	DTO3D	AFCS	Discrete					DTO3D generated signal from Data Link information: VECTOR VALID = $\overline{\text{TILT}}$ • ($\overline{\text{VECTOR + TRAFFIC + FCS MESSAGES}}$) • $\overline{\text{ACL MSG}}$ • $\overline{\text{FCS MSG}}$ • $\overline{\text{AMCS FAIL}}$ • $\overline{\text{[illegible] CMD}}$ • $\overline{\text{ABORT}}$ See Figure 1[illegible].
154	CLUTCHED MAG HDG ENGAGE	AFCS	CSDC (805)	AFCS	DTO3D	Discrete	5/Sec	1	5		Enable signal f[illegible] steering error (AHRS MAGNETIC). See Figure 1[illegible].
155	CMD HDG ENGAGE	AFCS (Roll Engage)	CSDC (805)	AFCS	DTO3D	Discrete	5/Sec	1	5		Enable signal for steering error([illegible]). See Figure 1[illegible].
156	CLUTCHED GRD TRACK ENGAGE	AFCS (Roll Computer)	CSDC (805)	AFCS	DTO3D	Discrete	5/Sec	1	5		Enable signal for steering error [illegible] See Figure 17.
[illegible]	ROLL SYNCHRO	AHRS (A24G - 27A)	CSDC (805)	AHRS	DTO3D	3 Wire Synchro				± 180 deg 0 to 11.8VAC 1 deg/deg	DTO3D conversion to DC Anal[illegible] data - SINE and COS roll transfer[illegible] to VTIG, ϕ SINE and ϕ COS ro[illegible] and roll rate (SIPO3[illegible]) and roll [illegible] are transmitted to the IFU. Used in c[illegible]dinate transforms. See Figure 15.
158	PITCH SYNCHRO	AHRS (A24G - 27A)	CSDC (805)	AHRS	DTO3D	3 Wire Synchro	400/Sec			± 90 deg 0 to 11.8VAC 1 deg/deg	DTO3D conversion to DC Analog and digital data - transferred to VTIG and IFU in digital form and to [illegible] in analog form. to VTIG: A/C PITCH to IFU: θ SINE + θ COS PITCH ANGLE (SIPO301), A/C PITCH RATE (SIPO303), A/C PITCH ANGLE ANALOG. Coordinate transforms. See Figure 16.

2184-090W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTI-ZATION	COMMENTS
159	MAGNETIC HDG SYNCHRO	AHRS (24G - 27A)	CSDC (805)	AHRS	DT02D	3 Wire Synchro				± 180 deg 0 to 11.8VAC 1 deg/deg	DT02D conversion to digital form, used to generate steering error (magnetic) - Figures 17 & 19. Also used by [illegible], VDIG & IFU - Figure 11 & 10.
160	AHRS HDG RELIABLE	AHRS (24G - 27A)	CSDC (805)	AHRS	DT02D	Discrete				28 VDC/OPEN	AHRS enable for AHRS synchro MAG HDG. If not reliable, switch to IFU back up HDG (SOP0411). See Figure 17 & 11.
161	AHRS COMPASS MODE	AHRS (24G - 27A)	CSDC (805)	AHRS	DT02D	Discrete					DT02D transmission to DT04D for retransmission to IFU in discrete data word [illegible]. See Figures 22, 17 & 11.
162	AHRS MAG SLAVE (COMPASS) MODE	AHRS (24G - 27A)	CSDC (805)	AHRS	DT02D	Discrete					DT02D transmission to DT04D for retransmission to IFU in discrete data word [illegible]. See Figure [illegible], 17 & 11.
163	TILT	D/L (ASW-27B)	CSDC (805)	D/L	DT03D	Discrete					Disable signal to DT03D when D/L messages are not being received and updated at correct rate. used in DT03D to place inhibit on PCT, VECTOR and ACL discretes to AFCS. See Figure 17.
164	SINS ALIGN	CSDC (805)	Left Glove Relay Box (SINS ALIGN RELAY)	DT03D	SINS ALIGN RELAY	Discrete					Energizes the SINS ALIGN RELAY when mode of operation is ALIGN. De-energize when in INERTIAL NAV MODE. See Figure 17.
165	ELEVATION LEAD ANGLE	CIACS (ACM PNL)	CSDC (805)	ACM PNL	DT03D	DC Analog				10 k ohm POT, -15° to [illegible]	DT03D performs A/D conversion and transmits digital data to [illegible] reticle [illegible] elevation. See Figure 14.
166	WEAPON TYPE SELECTED (MSP)	CIACS (ARM PNL)	CSDC (805)	ARM PNL	DT04D	Discrete				[illegible]	Transmitted [illegible] See Figure [illegible].

2184-094W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTI-ZATION	COMMENTS
167	WEAPON TYPE SELECTED (2SP)	CIACS (ARM PANEL)	CSDC (805)	ARM PNL	DTO3D	Discrete				6V/OV	Transmitted to [illegible] in Word 1[illegible]. See Figure [illegible].
168	WEAPON TYPE SELECTED (LSB)	CIACS (ARM PANEL)	CSDC (805)	ARM PNL	DTO3D	Discrete				6V/OV	Transmitted to VDI[illegible] in word 1[illegible]. See Figure [illegible].
169	WEAPON QUANTITY READY (MSB)	CIACS (ARM PANEL)	CSDC (805)	ARM PNL	DTO3D	Discrete				6V/OV	Transmitted to [illegible] in Word 1[illegible]. See Figure [illegible]5.
170	WEAPON QUANTITY READY (2SB)	CIACS (ARM PANEL)	CSDC (805)	ARM PNL	DTO3D	DISCRETE				6V/OV	Transmitted to [illegible] in word 1[illegible]. See Figure [illegible]
171	WEAPON QUANTITY READY (LSB)	CIACS (ARM PANEL)	CSDC (805)	ARM PNL	DTO3D	DISCRETE				6V/OV	Transmitted to [illegible] in word 1[illegible] See Figure [illegible].
172	MASTER ARM	CIACS (ARM PANEL)	CSDC (805)	ARM PNL	DTO3D	DISCRETE				6V/OV	Transmitted to [illegible] in word 1[illegible]. See Figure [illegible].
173	RELEASE MODE Back up	CIACS (ARM PANEL)	CSDC (805)	ARM PNL	DTO3D	DISCRETE				6V/OV	Transmitted to VDI[illegible] in word 1[illegible]. See Figure [illegible].
174	DISCRETE G	CSDC (805)	INTERFERANCE BLANKER	DTO2D	DECM YIG	DISCRETE				6V/OV	See Figure 1[illegible]
175	LOW LOX	LOX QTY. (INDICATOR)	CSDC (805)	LOX QTY INDICATOR	DTO2D	DISCRETE				OPEN/GND	DTO[illegible] Performs Priority Encoding & Transfer information to D/L as [illegible] BIT [illegible]de, See Figure [illegible]
176	ARM AKNOWLEDGE	D/L REPLY INSTRUMENT PANEL	CSDC (805)	D/L PNL	DTO4D	DISCRETE				OPEN/GND	DTO4D Encoding for transmission TO DT[illegible] See Figure [illegible]

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GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/ SEC	QUANTI-ZATION	COMMENTS
177	C1 REQUEST	D/L REPLY INSTRUMENT PANEL	CSDC (805)	D/L PNL	DT04D	DISCRETE				OPEN/GND	DT04D Encoding for transmission to DT03D See Figure 25
178	ABORT	D/L REPLY INSTRUMENT PANEL	CSDC (805)	D/L PNL	DT04D	Discrete				OPEN/GND	DT04D Encoding for transmission to DT03D See Figure 25
179	TARGET DESTROYED	D/L REPLY INSTRUMENT PANEL	CSDC (805)	D/L PNL	DT04D	DISCRETE				OPEN/GND	DT04D Encoding for transmission to DT03D See Figure 25
180	GENERAL ACKNOWLEDGE	D/L REPLY INSTRUMENT PANEL	CSDC (805)	D/L PNL	DT04D	DISCRETE				OPEN/GND	DT04D Encoding for transmission to DT03D See Figure 25
181	TARGET NOT DESTROYED	D/L REPLY INSTRUMENT PANEL	CSDC (805)	D/L PNL	DT04D	DISCRETE				OPEN/GND	DT04D Performs Priority Encoding & Transfers information to D/L as 5 BIT Code. See Figure 25
182	IFF EMERGENCY	IFF Control PANEL	CSDC (805)	IFF PNL	DT04D	DISCRETE				[illegible]V/GND	DT04D to DT03D Transmission See Figure [illegible]
183	R1 DISCRETE	CSDC (805)	D/L (ASW-27B)	DT03D	D/L	DISCRETE				GND/28V	DT03D Priority Encoded Bit to D/L Source is D/L Panel, IFF Control Panel & Lox Qty. Indicator See Figure 25.
184	R2 DISCRETE	CSDC (805)	D/L (ASW-27B)	DT03D	D/L	DISCRETE				GND/28V	DT03D Priority Encoded Bit to D/L Source is D/L Panel, IFF Control Panel & Lox Qty. Indicator See Figure 25.

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GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTIZATION	COMMENTS
185	R3 DISCRETE	CSDC (805)	D/L (ASW-27B)	DT03D	D/L	DISCRETE				GND/28V	DT03D Priority Encoded Bit to D/L. Source is D/L Panel, IFX Control Panel & Lox Qty. Indicator. See Figure [illegible]
186	R4 DISCRETE	CSDC (805)	D/L (ASW-27B)	DT03D	D/L	DISCRETE				GND/28V	DT03D Priority Encoded Bit to D/L. Source is D/L Panel, IFX Control Panel & Lox Qty. Indicator. See Figure 25
187	R5 DISCRETE	CSDC (805)	D/L (ASW-27B)	DT03D	D/L	DISCRETE				GND/28V	DT03D Priority Encoded Bit to D/L. Source is D/L Panel, IFX Control Panel & Lox Qty. Indicator. See Figure 25
188	AZIMUTH (DEVIATION)	ILS DECODER (KY-651/ ARA63)	CSDC (805)	ILS	DT01D	DC ANALOG	20/SEC			$\pm 6^{\circ}$ 4.72V/deg	DT01D to DT03D Transmission, DT03D Transmits this data in Serial Digital Form (ILS Lateral Error) to VDIG. See Figure 13
189	AZIMUTH FLAG ALARM	ILS DECODER (KY-651/ ARA63)	CSDC (805)	ILS	DT01D	DISCRETE				2.4V/GND	DT01D to DT03D Transmission, DT03D Transmits this data in Serial Digital Form (ILS Lateral Error) to VDIG. See Figure 13
190	ELEVATION DEVIATION	ILS DECODER (KY-651/ ARA 63)	CSDC (805)	ILS	DT01D	DC ANALOG	20/SEC			$\pm 1.4^{\circ}$ 0.636°/volt	DT01D to DT03D Transmission, DT03D Transmits information in Serial Digital (ILS Vertical Error) to VDIG. See Figure 13.
191	ELEVATION FLAG ALARM	ILS DECODER (KY-651/ ARA63)	CSDC (805)	ILS	DT01D	DISCRETE				2.4V/GND	DT01D to DT03D Transmission, DT03D Transmits information in Serial Digital (ILS Vertical Error) to VDIG. See Figure 13.

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GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/ SEC	QUANTI- ZATION	COMMENTS
19[illegible]	MANUAL MODE SELECT	PILOTS CONTROL & DISPLAY PANEL (PCDP)	CSDC (805)	PCDP	DTO2D	DISCRETE				GND/OPEN	DTO2D to DTO4D Transmission, DTO4D Transmits Information to the IFU (SIPO401). See Figure 22
19[illegible]	TACAN MODE (SELECT)	PILOTS CONTROL & DISPLAY PANEL (PCDP)	CSDC (805)	PCDP	DTO2D	DISCRETE				GND/OPEN	DTO2D to DTO4D Transmission, DTO4D Transmits Information to the IFU (SIPO401, See Figure 22
19[illegible]	DESTINATION MODE SELECT	PILOTS CONTROL & DISPLAY PANEL (PCDP)	CSDC (805)	PCDP	DTO2D	DISCRETE				GND/OPEN	DTO2D to DTO4D Transmission, DTO4D Transmits Information to the IFU (SIPO401 See Figure 22
19[illegible]	VECTOR MODE SELECT	PILOTS CONTROL & DISPLAY PANEL (PCDP)	CSDC (805)	PCDP	DTO2D	DISCRETE				GND/OPEN	DTO2D to DTO4D Transmission, DTO4D Transmits Information to the IFU (SIPO401 See Figure 22
196	AWL/PCD MODE SELECT	PILOTS CONTROL & DISPLAY PANEL (PCDP)	CSDC (805)	PCDP	DTO2D	DISCRETE				GND/OPEN	DTO2D to DTO4D Transmission, DTO4D Transmits Information to the IFU (SIPO401 See Figure 22
197	HANDBRAKE (INS SUSPEND ALINE)	LEFT GLOVE RELAY BOX (LGRB)	CSDC (805)	LGRB	DTO3D	DISCRETE				GND/OPEN	DTO3D to DTO4D Transmission, DTO4D Transmits Information to the IFU (SIPO401). See Figure 22
198	NAV COMPUTER FAIL	CSDC (805)	PILOT & NFO CAUTION & ADVISORY PANELS(C&A)	DTO1D	C&A	DISCRETE				GND/OPEN	Generated from Internal NAV Function Failures. See Figure 2[illegible]

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GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTI-ZATION	COMMENTS
199	SPACE STABILIZED COORDINATES	RADAR CONTROLLER (081)	CSDC (805)	RDR CONTROLLER	DTO2D	3 WIRE AC ANALOG				0 to 10.2 VAC	CSDC Transformation to A/C Coordinates & Transfer to RDR ANT (031). See Figure 27
200	A/C COORDINATES	CSDC (805)	RADAR ANTENNA (031)	DTO2D	RDR ANTENNA	3 WIRE AC ANALOG				0 to 10.2 VAC	Generated from RDR CNTLR (081), Space Stabilized Coordinates. See Figure 27.
201	A/C COORDINATES	RDR ANT (031)	CSDC (805)	RDR ANT	DTO2D	3 WIRE AC ANALOG				0 to 10.2 VAC	CSDC Transformation to Space Stabilized Coordinates & Transfer to RDR CNTLR (081). See Figure 27.
202	SPACE STABILIZED COORDINATES	CSDC (805)	RDR CNTLR (081)	DTO2D	RDR CNTLR	3 WIRE AC ANALOG				0 to 10.2 VAC	Generated from RDR ANT (031) A/C Coordinates. See Figure 27.
203	SPACE STABILIZED COORDINATES	IR AMP (120)	CSDC (805)	IR AMP	DTO2D	3 WIRE AC ANALOG				0 to 10.2 VAC	CSDC Transformation to A/C Coordinates for Transfer to IR AMP (120). See Figure 27.
204	A/C COORDINATES	CSDC (805)	IR AMP (120)	DTO2D	IR AMP	3 WIRE AC ANALOG				0 to 10.2 VAC	Generated from Space Stabilized Coordinates from IR AMP (120). See Figure 27.
205	EARTH STABILIZED COORDINATES	MDSC (710)	CSDC (805)	MDSC (710)	DTO2D	3 WIRE AC ANALOG				0 to 10.2 VAC	CSDC Transformation to A/C Coordinates & Transfer to Missile Data Signal Converter (710). See Figure 27.
206	A/C COORDINATES	CSDC (805)	MDSC (710)	DTO2D	MDSC (710)	3 WIRE AC ANALOG				0 to 10.2 VAC	Generated from MDSC (710). Earth Stabilized Coordinates See Figure 27.

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GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/ SEC	QUANTI- ZATION	COMMENTS
207	TRANSPONDER-RCVR-XMTR STATUS	TRANSPOWDER TEST SET TS-1843/ APX-72 (IFF SYSTEM)	CSDC	APX 72	DT3	PULSE: GO = 28VDC NO GO = OVDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500 , Information is Transmitted to AMCS/IFU in SIP0501-05. See Figure 4.
208	TRANSPONDER-RCVR-XMTR BIT INITIATE NO.1	CSDC	TRANSPONDER TEST SET TS-1843/ APX-72 (IFF SYSTEM)	DT3	APX 72	PULSE: INITIATE=GND FOR 4 SEC, NORMAL = 28 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500 , Information is Transmitted to AMCS/IFU in SIP0501-05. See Figure 4.
209	TRANSPONDER-RCVR-XMTR BIT INITIATE NO.2	CSDC	TRANSPONDER TEST SET TS-1843/ APX-72 (IFF SYSTEM)	DT3	APX 72	PULSE: INITIATE=GND FOR 1 SEC, NORMAL=28VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500 , Information is Transmitted to AMCS/IFU in SIP0501-05. See Figure 4.
210	TRANSPONDER-RCVR-XMTR MODE 3A ENABLE	CSDC	TRANSPONDER RCVR-XMTR APX-72 (IFF SYSTEM)	DT3	APX 72	PULSE: ENABLE=GND FOR 4 SEC, NORMAL= 28 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500 , Information is Transmitted to AMCS IFU in SIP0501-05. See Figure 4.
211	TRANSPONDER-RCVR-XMTR MODE C ENABLE	CDSC	TRANSPONDER RCVR-XMTR APX-72 (IFF SYSTEM)	DT3	APX 72	PULSE: ENABLE=GND FOR 1 SEC, NORMAL = 28 VDC	OBC DEPENDENT				Valid when CMD initiated by OBC (AMCS/IFU SOP0500 , Information is Transmitted to AMCS IFU in SIP0501-05. See Figure 4.
212	ALQ-100 RCVR-XMTR GO/NO-GO	ALQ-100 RCVR-XMTR (ECM SYSTEM)	CSDC	ALQ-100	DT4	PULSE: GO = 28 VDC NO GO = GND	OBC DEPENDENT				Valid when CMD initiated by OBC (AMCS IFU SOP0500 , Information is Transmitted to AMCS IFU in SIP0501-05. See Figure 4.
213	ALQ-100 RCVR-XMTR TEST ENABLE	ALQ-100 RCVR-XMTR (ECM SYSTEM)	CSDC	ALQ-100	DT4	PULSE ENABLE 28 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500 , Information is Transmitted to AMCS/IFU in SIP0501-05. See Figure 4.

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GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTIZATION	COMMENTS
214	ALQ-100 BIT INITIATE	CSDC	ALQ-100 RCVR-XMTR (ECM SYSTEM)	DT4	ALQ-100	PULSE: INITIATE=28 VDC FOR 35 SEC, NORMAL = OPEN	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS IFU [illegible]), Information [illegible] Transmitted to AMCS IFU in [illegible] See Figure [illegible]
215	RADAR ALTIMETER RCVR-XMTR STATUS	RADAR ALTIMETER RCVR-XMTR APN-194 (NAV SYSTEM)	CSDC	RDR ALT	DT1	PULSE: GO = 4.5 VDC NO GO = GND	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU [illegible]), Information [illegible] Transmitted to AMCS/IFU in SIP[illegible]1-05[illegible] See Figure [illegible]
216	RADAR ALTIMETER RCVR-XMTR BIT INITIATE	CSDC	RADAR ALTIMETER RCVR-XMTR APN-194 (NAV SYSTEM)	DT1	RDR ALT	PULSE: INITIATE = GND FOR 1 SEC, NORMAL = 28 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS IFU [illegible]), Information is Transmitted to AMCS IFU in SIP0501-[illegible] See Figure [illegible]
217	ALR-45 ANALYZER STATUS NO.1	ALR-45 ANALYZER (ECM SYSTEM)	CSDC & MDIG	ALR-45	DT3	PULSE GO = GND NO GO = 25 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS IFU [illegible]), Information is Transmitted to AMCS IFU in SIP0501-0505 See Figure [illegible]
218	ALR-45 ANALYZER STATUS NO.2	ALR-45 ANALYZER (ECM SYSTEM)	CSDC & MDIG	ALR-45	DT3	PULSE: GO = GND NO GO = 25 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS IFU SOP0500), Information is Transmitted to AMCS IFU in [illegible]1-0505 See Figure 4.
219	ALR-45 ANALYZER STATUS NO.3	ALR-45 ANALYZER (ECM SYSTEM)	CSDC & MDIG	ALR-45	DT3	PULSE: GO = GND NO GO = 25 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS IFU SOP0500), Information is Transmitted to AMCS IFU in SIP0501-0505 See Figure 4.
220	ALR-45 ANALYZER STATUS NO.4	ALR-45 ANALYZER (ECM SYSTEM)	CSDC & MDIG	ALR-45	DT3	PULSE: GO = GND NO GO = 25 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information is Transmitted to AMCS IFU in SIP0501-0505 See Figure 4.

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GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTI-ZATION	COMMENTS
221	ALR-45 ANALYZER STATUS NO. 5	ALR-45 ANALYZER (ECM SYSTEM)	CSDC & MDIG	ALR-45	DT3	PULSE: GO = GND NO GO = 25 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information is Transmitted to AMCS/IFU in SIP0501-0505 See Figure 4.
222	ALR-45 ANALYZER STATUS NO. 6	ALR-45 ANALYZER (ECM SYSTEM)	CSDC & MDIG	ALR-45	DT3	PULSE: GO = GND NO GO = 25 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500, Information is Transmitted to AMCS/IFU in SIP0501-0505 See Figure 4.
223	ALR-45 ANALYZER BIT INITIATE NO. 1	CSDC	ALR-45 ANALYZER	DT3	ALR-45	PULSE: INITIATE=5VDC FOR 1 SEC, NORMAL OPEN	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information is Transmitted to AMCS/IFU in SIP0501-0505 See Figure 4.
224	ALR-45 ANALYZER BIT INITIATE NO. 2	CSDC	ALR-45 ANALYZER	DT3	ALR-45	PULSE: INITIATE=5VDC FOR 1 SEC, NORMAL = OPEN	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information is Transmitted to AMCS/IFU in SIP0501-0505 See Figure 4.
225	ALR-45 ANALYZER BIT INITIATE NO.3	CSDC	ALR-45 ANALYZER	DT3	ALR-45	PULSE: INITIATE=5VDC FOR 1 SEC. NORMAL = OPEN	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information is Transmitted to AMCS/IFU in SIP0501-0505 See Figure 4.
226	ALR-45 ANALYZER BIT INITIATE NO. 4	CSDC	ALR-45 ANALYZER	DT3	ALR-45	PULSE: INITIATE=5VDC FOR 1 SEC. NORMAL = OPEN	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information is Transmitted to AMCS/IFU in SIP0501-0505 See Figure 4.
227	ALR-50 RCVR STATUS	ALR-50 RCVR (ECM SYSTEM)	CSDC & MDIG	ALR-50	DT3	PULSE: GO = OVDC NO GO = 28 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS IFU SOP0500), Information is Transmitted to AMCS IFU in SIP0501 to 0505 See Figure 5.

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GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTIZATION	COMMENTS
228	ALR-50 RCVR BIT INITIATE	CSDC	ALR-50 RCVR (ECM SYSTEM)	DT3	ALR-50	PULSE: INITIATE = 28VDC FOR 15 SEC, NORMAL = OPEN	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information is Transmitted to AMCS/IFU in SIP0501 to 0505. See Figure 4.
229	BEACON AUGMENTER STATUS	BEACON AUGMENTER R-1623 APN (COMM SYSTEM)	CSDC	BEACON AUG.	DT1	PULSE: GO = GND NO GO = 28 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information is Transmitted to AMCS/IFU in SIP0501 to 0505. See Figure 4.
230	BEACON AUGMENTER BIT INITIATE	CSDC	BEACON AUGMENTER R-1623 APN (COMM SYSTEM)	DT1	BEACON AUG.	PULSE: INITIATE=28VDC FOR 3 SEC, NORMAL = OPEN	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information is Transmitted to AMCS/IFU in SIP0501 to 0505. See Figure 4.
231	DETAIL DATA INDICATOR STATUS	DETAIL DATA INDICATOR (DDI) ID-1744/AS	CSDC	DDI	DT4	PULSE: GO = GND NO GO = OPEN	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information is Transmitted to AMCS/IFU in SIP0501 to 0505. See Figure 4
232	DATA LINK CONVERTER BIT INITIATE	CSDC	DATA LINK CONVERTER CV 2441B/ ASW-27	DD3	DTL	PULSE: INITIATE=28 VDC FOR 15 SEC, NORMAL=OPEN	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information is Transmitted to AMCS/IFU in SIP0501 to 0505. See Figure 4.
233	DDI STATUS	DETAIL DATA INDICATOR (DDI) ID-1744/AS	CSDC	DDI	DT4	PULSE: GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information is Transmitted to AMCS/IFU in SIP0501 to 0505. See Figure 4.

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GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTI-ZATION	COMMENTS
234	DDI BIT INITIATE	CSDC	DETAIL DATA IN-DICATIOR (DDI) ID-1744/AS	DT4	DDI	PULSE: INITIATE=28VDC FOR 15 SEC, NORMAL = OPEN					
235	INTERROGATOR SWITCH AMPLIFIER STATUS	INTERROGA-TOR SWITCH AMPLIFIER SA 1568/ APX 76(IFF SYSTEM)	CSDC	APX 76	DT3	DISCRETE GO = OPEN NO GO = GND	OBC DEPENDENT				Continuous Monitor by OBC (AMCS/IFU SOP0500), Information is Transmitted to AMCS/IFU in SIP0501 to 0505. See Figure 4.
236	INTERROGATOR SYSTEM FAULT INDICATION	INTERROGATOR SYNCHRONIZER SN 416A/APX 76 (IFF SYSTEM)	CSDC	APX 76	DT3	DISCRETE FAULT=28VDC NO FAULT=OVDC	OBC DEPENDENT				Continuous Monitor by OBC (AMCS/IFU SOP0500), Infomation is Transmitted to AMCS/IFU in SIP0501 to 0505. See Figure 4.
237	CHALLENGE INDICATION	INTERROGATOR SYNCHRONIZER SN 416A/AFX 76 (IFF SYSTEM)	CSDC	APX 76	DT3	DISCRETE CHALLENGE=28VDC NO CHALLENGE = O VDC	OBC DEPENDENT				Continuous Monitor by OBC (AMCS/IFU SOP0500), Information is Transmitted to AMCS/IFU in SIP0501 to 0505. See Figure 4.
238	INTERROGATOR COMPUTER STATUS	INTERROGATOR COMPUTER KIT-1A TSEC (IFF SYSTEM)	CSDC	KIT 1A COMP	DT3	DISCRETE GO = OPEN NO GO = GND	OBC DEPENDENT				CMD INITIATED by OBC (SOP0500), Status Transmitted to IFU in SIP0501-0505 See Figure 4
239	INTERROGATOR RCVR XMTR STATUS	INTERROGATOR RCVR-XMTR RT 868A/ APX 76 (IFF SYSTEM)	CSDC	APX 76	DT3	DISCRETE GO = OPEN NO GO = GND	OBC DEPENDENT				CONTINUOUS MONITOR See Figure 4
240	THROTTLE CONTROL COMPUTER (APC) STATUS	THROTTLE CONTROL COMPUTER CP1040 ASN105	CSDC	APC	DT1	DISCRETE, GO = 4.5 VDC NO GO = O VDC	OBC DEPENDENT				CMD INITIATED BY OBC See Figure 4

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GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTI-ZATION	COMMENTS
241	APC TEST COMPLETE DISCRETE	THROTTLE CONTROL COMPUTER CP1040 ASN105	CSDC	APC	DT1	DISCRETE COMPLETE=4.5VDC INCOMPLETE=OVDC	OBC DEPENDENT				CMD INITIATED BY [illegible] See Figure [illegible]
242	APC NORMAL ACCELERO-METER STATUS	THROTTLE CONTROL COMPUTER CP1040 ASN105	CSDC	APC	DT1	DISCRETE COMPLETE=4.5VDC NO GO = 0 VDC	OBC DEPENDENT				CMD INITIATED BY [illegible] See Figure [illegible]
243	APC THROTTLE CONTROL SYSTEM BIT INITIATE	CSDC	THROTTLE CONTROL COMPUTER CP 1040 ASN 105	DT1	APC	INITIATE=28VDC FOR 3 SEC NORMAL-OPEN	OBC DEPENDENT				CMD INITIATED BY [illegible] See Figure [illegible]
244	TACAN SET BIT INITIATE/STATUS	CSDC/TACAN	TACAN/CSDC	DT1/TACAN	TACAN/DT1	PULSE: INITIATE=28VDC FOR 15 SEC NORMAL=0 to [illegible] VDC	OBC DEPENDENT				Command Initiated [illegible] Status [illegible] Bit Initiate Line See Figure [illegible]
245	AHRS AMPLIFIER STATUS	AHRS AMPLIFIER ASK 32/11A/ A24G39	CSDC	AHRS AMP	DT[illegible]	DISCRETE GO [illegible] 28 VDC NO GO [illegible] OPEN	OBC DEPENDENT				CONTINUOUS MONITOR TRANSMITTED to IPU in SIPO50 to SIPO5[illegible] See Figure [illegible]
246	RIGHT STATIC PRESSURE STATUS	RIGHT AIR INLET PRO-GRAMMER C 8684/A	CSDC	RIGHT AIR INLET PROGRAMMER	DT[illegible]	DISCRETE GO = 4.5 VDC NO GO = OVDC	OBC DEPENDENT				CMD INITIATED by [illegible] Information Transmitted to IPU [illegible] See Figure [illegible]
247	RIGHT TOTAL PRESSURE STATUS	RIGHT AIR INLET PRO-GRAMMER C 8684/A	CSDC	RIGHT AIR INLET PROGRAMMER	DT[illegible]	DISCRETE [illegible]	[illegible]				CMD INITIATED by [illegible] Information Transmitted to IPU [illegible] See Figure [illegible]

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GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTIZATION	COMMENTS
248	RIGHT TOTAL TEMPERATURE STATUS	RIGHT AIR INLET PROGRAMMER C 8684/A	CSDC	RIGHT AIR INLET PROGRAMMER	DT4	DISCRETE GO = 4.5 VDC NO GO=0 VDC	OBC DEPENDENT				CMD INITIATED by SOP0500, Information Transmitted to IFU (SIP0501-0505) See Figure 4
249	RIGHT ANGLE OF ATTACK STATUS	RIGHT AIR INLET PROGRAMMER C 8684A	CSDC	RIGHT AIR INLET PROGRAMMER	DT4	DISCRETE GO = 4.5 VDC NO GO= 0 VDC	OBC DEPENDENT				CMD INITIATED by SIP0500, Information Transmitted to IFU (SIP0501-0505) See Figure 4
250	RIGHT BLEED DOOR SERVO CYLINDER STATUS	RIGHT AIR INLET PROGRAMMER C 8684A	CSDC	RIGHT AIR INLET PROGRAMMER	DT4	DISCRETE GO = 4.5 VDC NO GO= OVDC	OBC DEPENDENT				CMD INITIATED by SOP0500, Information Transmitted to IFU (SIP[illegible]) See Figure 4
251	FIRST RIGHT COMPRESSOR RAMP SERVO CYLINDER STATUS	RIGHT AIR INLET PROGRAMMER C 8684A	CSDC	RIGHT AIR INLET PROGRAMMER	DT4	DISCRETE GO = 4.5 VDC NO GO= 0 VDC	OBC DEPENDENT				CMD INITIATED by SOP0500, Information Transmitted to IFU (SIP[illegible]) See Figure 4
252	SECOND RIGHT COMPRESSOR RAMP SERVO CYLINDER STATUS	RIGHT AIR INLET PROGRAMMER C 8684A	CSDC	RIGHT AIR INLET PROGRAMMER	DT4	DISCRETE GO = 4.5 VDC NO GO= 0 VDC	OBC DEPENDENT				CMD INITIATED by SOP0500, Information Transmitted to IFU (SIP[illegible]) See Figure [illegible]
253	RIGHT DIFFUSER RAMP SERVO CYLINDER STATUS	RIGHT AIR INLET PROGRAMMER C 8684A	CSDC	RIGHT AIR INLET PROGRAMMER	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				CMD INITIATED by [illegible], Information Transmitted to IFU [illegible] See Figure [illegible]
254	RIGHT AIR INLET CONTROL PROGRAMMER STATUS	RIGHT AIR INLET PROGRAMMER C 8684/A	CSDC	RIGHT AIR INLET PROGRAMMER	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated by [illegible] AMCS IFU [illegible], Information Transmitted to AMCS IFU [illegible] See Figure [illegible]

2184-106W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/ SEC	QUANTI-ZATION	COMMENTS
255	LEFT AIR INLET CON-TROL PROGRAMMER STATUS	LEFT AIR INLET PR-GRAMMER [illegible] 8684/A	CSDC	LEFT AIR INLET PRO-GRAMMER	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when [illegible] Initiated by [illegible] AMC [illegible] IFU SCP[illegible]), Information is Transmitted to AMCS/IFU in [illegible] See Figure [illegible]
255	LEFT AIR INLET CONTROL PROGRAMMER STATUS	LEFT AIR INLET PRO-GRAMMER [illegible] 8684 A	CSDC	LEFT AIR INLET PRO-GRAMMER	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when [illegible] Initiated by [illegible] SCP0500), Information is Transmitted to AMCS/IFU in SIP[illegible] See Figure [illegible]
256	LEFT STATIC PRESSURE SENSOR STATUS	LEFT AIR INLET PRO-GRAMMER [illegible] 8684 A	CSDC	LEFT AIR INLET PRO-GRAMMER	DT3	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when [illegible] Initiated by [illegible] (AMCS IFU SCP0500), Information is Transmitted to AMCS/IFU in SIP[illegible] See Figure [illegible]
257	LEFT TOTAL PRESSURE SENSOR STATUS	LEFT AIR INLET PR-GRAMMER [illegible] 8684/A	CSDC	LEFT AIR INLET PRO-GRAMMER	DT3	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when [illegible] Initiated by OBC (AMCS/IFU SCP0500), Information is Transmitted to AMCS/IFU in SIP501-0505 See Figure [illegible]
258	LEFT TOTAL TEMP. STATUS	LEFT AIR INLET PRO-GRAMMER [illegible] 8684 A	CSDC	LEFT AIR INLET PRO-GRAMMER	DT[illegible]	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when [illegible] Initiated by [illegible] AMCS IFU SCP0500), Information is Transmitted to AMCS/IFU in SIP501-0404 See Figure [illegible]
259	LEFT ANGLE OF ATTACK STATUS	LEFT AIR INLET PRO-GRAMMER [illegible] 8684/A	CSDC	LEFT AIR INLET PRO-GRAMMER	DT[illegible]	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when [illegible] Initiated by [illegible] AMCS IFU SCP[illegible]), Information is Transmitted to AMCS IFU in SIP501-[illegible] See Figure [illegible]
260	FIRST LEFT COMPRESSER RAMP SERVO CYLINDER	LEFT AIR INLET PRO-GRAMMER [illegible] 8684/A	CSDC	LEFT AIR INLET PRO-GRAMMER	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when [illegible] Initiated by [illegible] (AMCS IFU SCP0500), Information is Transmitted to AMCS/IFU in SIP501-[illegible] See Figure [illegible]

2184-105W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/ SEC	QUANTI- ZATION	COMMENTS
261	SECOND LEFT COMPRESSOR RAMP SERVO CYLINDER STATUS	LEFT AIR INLET PRO- GRAMMER C8684/A	CSDC	LEFT AIR INLET PRO- GRAMMER	DT3	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD initiated by OBC (AMCS/IFU SOP0500), Information is Transmitted to AMCS/IFU in SIP0501-0505. See Figure 4.
262	LEFT DIFFUSER RAMP SERVO CYLINDER STATUS	LEFT AIR INLET PRO- GRAMMER C 8684/A	CSDC	LEFT AIR INLET PRO- GRAMMER	DT3	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information is Transmitted to AMCS/IFU in SIP0501-0505 See Figure 4.
263	LEFT BLEED DOOR SERVO CYLINDER STATUS	LEFT AIR INLET PRO- GRAMMER C 8684/A	CSDC	LEFT AIR INLET PRO- GRAMMER	DT3	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information is Transmitted to AMCS/IFU in SIP0501-0505. See Figure 4.
264	RIGHT AIR INLET BIT INITIATE	CSDC	RIGHT AIR INLET PRO- GRAMMER C 8684/A	DT4	RIGHT AIR INLET PROGRAMMER	PULSE INITIATE=5VDC FOR 3 SEC NORMAL=OPEN					Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information is Transmitted to AMCS/IFU in SIP0501-0505. See Figure 4.
265	LEFT AIR INLET BIT INITIATE	CSDC	LEFT AIR INLET PRO- GRAMMER C 8684A	DT3	LEFT AIR INLET PROGRAMMER	PULSE INITIATE=5VDC FOR 3 SEC NORMAL=OPEN					Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information is Transmitted to AMCS/IFU in SIP0501-0505. See Figure 4.
266	ECM DISPLAY INDICATOR STATUS	INDICATOR GROUP CON- TROL/POWER SUPPLY C8573/ASA-79	CSDC	MDI?	DT3	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Continuous Monitor Information Transmitted to IFU in SIP 0501-0505. See Figure 4.

2184-107W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTI-ZATION	COMMENTS
267	HUD INDICATOR STATUS	INDICATOR GROUP CONTROL/POWER SUPPLY C8573/ASA-79	CSDC	MDIG	DT3	DISCRETE GO = 4.5 VDC NO GO = 0VDC	OBC DEPENDENT				Continuous Monitor Information Transmitted to IFU in SIP0501-0505. See Figure 4.
268	PROCESSOR STATUS	INDICATOR GROUP CONTROL/POWER SUPPLY C8573/ASA-79	CSDC	MDIG	DT3	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Continuous Monitor Information Transmitted to IFU in SIP0501-0505. See Figure 4.
269	VDI CONVERTER STATUS	ADI CONVERTER	CSDC	VDIG	DT3	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Continuous Monitor Information Transmitted to IFU in SIP0501-0505. See Figure 4.
270	VDI INDICATOR STATUS	ADI CONVERTER	CSDC	VDIG	DT3	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Continuous Monitor Information Transmitted to IFU in SIP0501-0505. See Figure 4.
271	HUD CONVERTER STATUS	ADI CONVERTER	CSDC	VDIG	DT3	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Continuous Monitor Information Transmitted to IFU in SIP0501-0505. See Figure 4.
272	HUD INDICATOR STATUS	ADI CONVERTER	CSDC	VDIG	DT3	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Continuous Monitor Information Transmitted to IFU in SIP0501-0505. See Figure 4.
273	CRYPTO COMPUTER STATUS	COMPUTER KIT-1A/TSEC	CSDC			DISCRETE GO = OPEN NO GO = GND	OBC DEPENDENT				Continuous Monitor Information Transmitted to IFU in SIP0501-0505. See Figure 4.
274	INTERFERANCE BLANKER STATUS	INTERANCE BLANKER MX-8811A	CSDC	BLANKER	DT2	PULSE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (IF SOP0500), Information Transmitted in SIP0501 to 0505. See Figure 4.

2184-109W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/ SEC	QUANTI-ZATION	COMMENTS
275	INTERFERANCE BLANKER BIT INITIATE	CSDC	INTERANCE BLANKER MX-8811A	DT2	BLANKER	INITIATE-28VDC FOR 1 SEC NORMAL = OPEN	OBC DEPENDENT				Valid when CMD Initiated by OBC (IFU SOP0500), Information Transmitted in SIP0501 to 0505. See Figure 4.
276	GUN CONTROLLER STATUS	GUN CONTROLLER C8571/A (ARMAMENT SYSTEM)	CSDC	GUN CONTROLLER	DT1	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (IFU SOP0500), Information Transmitted in SIP0501 to 0505. See Figure 4.
277	GUN CONTROLLER BIT INITIATE	CSDC	GUN CONTROLLER C 8571/A (ARM SYSTEM)	DT1	GUN CONTROLLER	PULSE INITIATE= 5VDC FOR 2 SEC NORMAL=OPEN	OBC DEPENDENT				Valid when CMD Initiated by OBC (IFU SOP0500), Information Transmitted in SIP0501 to 0505. See Figure 4.
278	FUSE FUNCTION CONTROL STATUS	ARMAMENT PANEL C8579/AWG 15 (ARMAMENT SYSTEM)	CSDC	AWG-15	DT4	DISCRETE GO = 28VDC or OPEN NO GO = GND	OBC DEPENDENT				Continuous Monitor. Transmitted to IFU (SIP0501-0505) See Figure 4.
279	B DECODER STA NO. 7 STATUS	POWER SWITCHING UNIT SA 1749/AWG15 (ARMAMENT SYSTEM)	CSDC	AWG-15	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (IFU SOP0500), Information Transmitted to IFU in SIP0501-0505 See Figure 4
280	B DECODER STA. NO 4/5 STATUS	POWER SWITCHING UNIT SA 1749/AWG15 (ARMAMENT SYSTEM)	CSDC	AWG-15	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (IFU SOP0500), Information Transmitted to IFU in SIP0501-0505 See Figure 4

2184-108W

5916-108

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTI-ZATION	COMMENTS
281	B DECODER STA. NO. 3/6 STATUS	POWER SWITCHING UNIT SA1749/ AWG 15 (AR-MAMENT SYSTEM)	CSDC	AWG-15	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated B OBC (IFU SOP0500), Information Transmitted to IFU in SIP0501-0505 See Figure 4
282	B DECODER STA. NO. 2 STATUS	POWER SWITCH-ING UNIT SA 1749/AWG 15 (ARMAMENT SYSTEM)	CSDC	AWG-15	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated B OBC (IFU SOP0500), Information Transmitted to IFU in SIP0501-0505 See Figure 4
283	A DECODER STA NO. 8 STATUS	POWER SWITCH-ING UNIT SA 1749/AWG 15 (ARMAMENT SYSTEM)	CSDC	AWG-15	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated B OBC (IFU SOP0500), Information Transmitted to IFU in SIP0501-0505 See Figure 4
284	A DECODER STA NO. 6 STATUS	POWER SWITCH-ING UNIT SA 1749/AWG 19 (ARMAMENT SYSTEM)	CSDC	AWG-15	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated B OBC (IFU SOP0500), Information Transmitted to IFU in SIP0501-0505 See Figure 4
285	A DECODER STA. NO. 5	POWER SWITCH-ING UNIT SA 1749/AWG 15 (ARMAMENT SYSTEM)	CSDC	AWG-15	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DISCRETE				Valid when CMD Initiated B OBC (IFU SOP0500), Information Transmitted to IFU in SIP0501-0505 See Figure 4
286	A DECODER STA. NO. 4 STATUS	POWER SWITCH-ING UNIT SA 1749/AWG 19 (ARMAMENT SYSTEM)	CSDC	AWG-15	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated B OBC (IFU SOP0500), Information Transmitted to IFU in SIP0501-0505 See Figure 4
287	A DECODER STA. NO. 3	POWER SWITCH-ING UNIT SA 1749/AWG 15 (ARMAMENT SYSTEM)	CSDC	AWG-15	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated B OBC (IFU SOP0500), Information Transmitted to IFU in SIP0501-0505 See Figure 4

2184-110W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/ SEC	QUANTI- ZATION	COMMENTS
288	A DECODER STA. NO.1 STATUS	POWER SWITCH- ING UNIT SA 1749/AWG 15 (ARMAMENT SYSTEM)	CSDC	AWG-15	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated B OBC (IFU SOP0500), Information Transmitted to IFU in SIP0501-0505 See Figure 4
289	POWER SWITCHING UNIT STATUS	POWER SWITCH- ING UNIT SA 1749/AWG 15 (ARMAMENT SYSTEM)	CSDC	AWG-15	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated B OBC (IFU SOP0500) Information Transmitted to IFU in SIP0501-0505 See Figure 4
290	AWG 15 BIT INITIATE 1	CSDC	POWER SWITCHING UNIT SA 1749- AWG-15	DT4	AWG-15	PULSE INITIATE=5VDC FOR 4 SEC NORMAL=OPEN	OBC DEPENDENT				Valid when CMD Initiated B OBC (IFU SOP0500) Information Transmitted to IFU in SIP0501-0505 See Figure 4
291	AWG-15 BIT	CSDC	POWER SWITCHING UNIT SA 1749- AWG-15	DT4	AWG-15	PULSE INITIATE=5VDC FOR 4 SEC NORMAL=OPEN	OBC DEPENDENT				Valid when CMD Initiated B OBC (IFU SOP0500) Information Transmitted to IFU. in SIP0501-0505 See Figure 4
292	ARMAMENT PANEL STATUS	ARMAMENT PANEL C8579/AWG 15	CSDC	AWG-15	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/ IFU SOP0500), Information Transmitted to AMCS/IFU in SIP0501-05 See Figure 4
293	YAW ACCELEROMETER STATUS	YAW COM- PUTER CP1031 ASW 32	CSDC	AFCS-YAW	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/ IFU SOP0500), Information Transmitted to AMCS/IFU in SIP0501-05 See Figure 4
294	YAW RATE SENSOR STATUS	YAW COM- PUTER CP1031 ASW 32	CSDC	AFCS-YAW	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/ IFU SOP0500), Information Transmitted to AMCS/IFU in SIP0501-05 See Figure 4

2184-112W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTI-ZATION	COMMENTS
295	YAW SERIES SERVO ACTUATOR STATUS	YAW COM-PUTER CP 1031 ASW 32	CSDC	AFCS-YAW	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information Transmitted to AMCS/IFU in SIP0501-05 See Figure 4
296	YAW COMPUTER STATUS	YAW COM-PUTER CP 1031 ASW 32	CSDC	AFCS-YAW	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information Transmitted to AMCS/IFU in SIP0501-05 See Figure 4
297	PITCH RATE SENSOR STATUS	PITCH COMPUTER CP1030 ASW 32	CSDC	AFCS-PITCH	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information Transmitted to AMCS/IFU in SIP0501-05 See Figure 4
298	PITCH SERIES SERVO ACTUATOR STATUS	PITCH COMPUTER CP1030 ASW 32	CSDC	AFCS-PITCH	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information Transmitted to AMCS/IFU in SIP0501-05 See Figure 4
299	PITCH COMPUTER STATUS	PITCH COMPUTER CP1030 ASW 32	CSDC	AFCS-PITCH	DT4	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information Transmitted to AMCS/IFU in SIP0501-05 See Figure 4
300	ROLL RATE SENSOR STATUS	ROLL COM-PUTER CP 1029 ASW 32	CSDC	AFCS-ROLL	DT3	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information Transmitted to AMCS/IFU in SIP0501-05 See Figure 4
301	ROLL SERIES SERVO ACTUATOR STATUS	ROLL COM-PUTER CP 1029 ASW 32	CSDC	AFCS_ROLL	DT3	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information Transmitted to AMCS/IFU in SIP0501-05 See Figure 4

21840111W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/SEC	QUANTIZATION	COMMENTS
302	ROLL COMPUTER STATUS	ROLL COMPUTER CP 1029 ASW 32	CSDC	AFCS-ROLL	DT3	DISCRETE GO = 4.5 VDC NO GO = 0 VDC	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information Transmitted to AMCS/IFU in SIP0501-05. See Figure 4
303	RSSCS BIT INITIATE	CSDC	P, Y&R COMPUTERS ASW 32	DT4	AFCS-P, Y, R	PULSE INITIATE=28VDC FOR 3 SEC NORMAL = OPEN	OBC DEPENDENT				Valid when CMD Initiated by OBC (AMCS/IFU SOP0500), Information Transmitted to AMCS/IFU in SIP0501-05. See Figure 4
304	IMU P.S. STATUS	IMU POWER SUPPLY PP 6188/ASN 92V	CSDC	IMU (NAV) P.S.	DT2	DISCRETE GO = 15 VDC NO GO = 0 VDC	OBC DEPENDENT				Continuous Monitor, Transmitted to IFU in SIP0501-0505 Figure 4
305	IMU STATUS	IMU CN1263/ASN92V	CSDC	IMU	DT1	DISCRETE GO = 15VDC NO GO = OVDC	OBC DEPENDENT				CONTINUOUS MONITORING, TRANSMITTED TO IFU IN STP0501 - 0505 SEE FIGURE 4
306	CADC STATUS	CADC (CP1035A)	CSDC	CADC	DT4	DISCRETE GO = 4.5 VDC NO GO = OVDC	OBC DEPENDENT				VALID WHEN CMD INITIATED BY OBC (SOP0500), INFORMATION TRANSMITTED TO IFU IN SIP0501 to 0505 SEE FIGURE 4
307	CADC BIT INITIATE	CSDC	CADC (CP1035A)	DT4	CADC	PULSE INITIATE=GND FOR 3 SEC NORMAL = 20 VDC	OBC DEPENDENT				VALID WHEN CMD INITIATED BY OBC (SOP0500), INFORMATION TRANSMITTED TO IFU IN SI0501 TO 0505 SEE FIGURE 4
308	WOW DISCRETE	LEFT GLOVE RELAY BOX	CSDC	LGRB	DT3	OPEN/GND					OBC & ALIGNMENT INTERLOCK SEE FIGURE 8
309	WOW DISCRETE	LEFT GLOVE RELAY BOX	CSDC	LGRB	DT3	OPEN/GND					OBC & ALIGNMENT INTERLOCK SEE FIGURE 6
310	PILOT'S OBC DISCRETE	CSDC	MASTER TEST PNL	DT 2	MASTER TEST PNL	DISCRETE					OBC ENABLE FOR CLASS 2A OBC SEE FIGURE 8

2184-113W

GPMS SIGNAL LIST

ITEM NO.	SIGNAL NAME	PRESENT SOURCE	PRESENT SINK	GPMS SOURCE	GPMS SINK	SIGNAL TYPE	SAMPLE RATE	MESSAGE LENGTH	BITS/ SEC	QUANTI- ZATION	COMMENTS
311	FUEL QUANTITY	FUEL QUANTITY SENSOR	CSDC	FUEL QUANTITY SENSOR	DT2	D/C ANALOG					TO D/L (R/O MSG) CODED INTO 6 BITS, FIG 17

2184-114W

APPENDIX B

GPMS FUNCTIONAL FLOW BLOCK DIAGRAMS

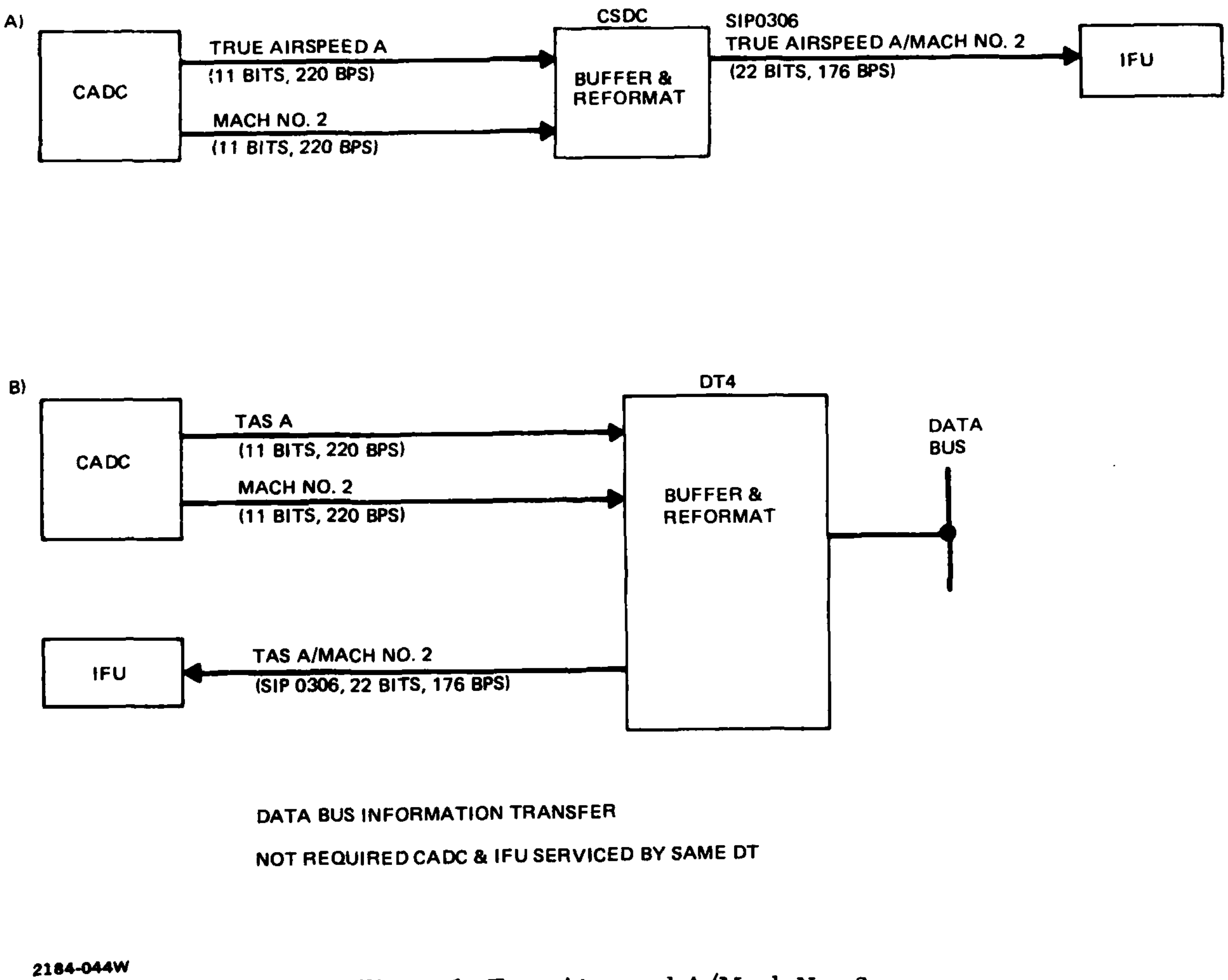
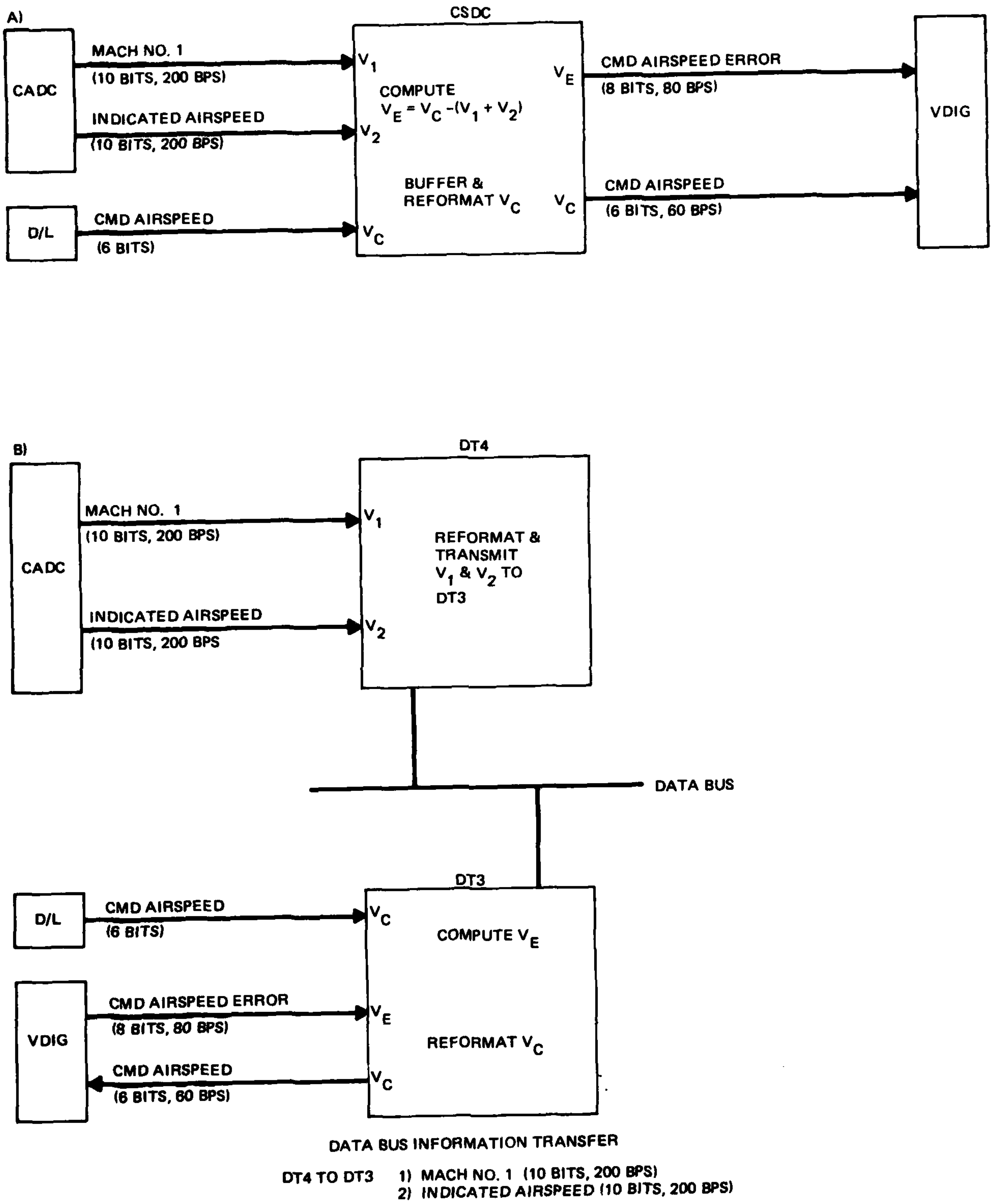
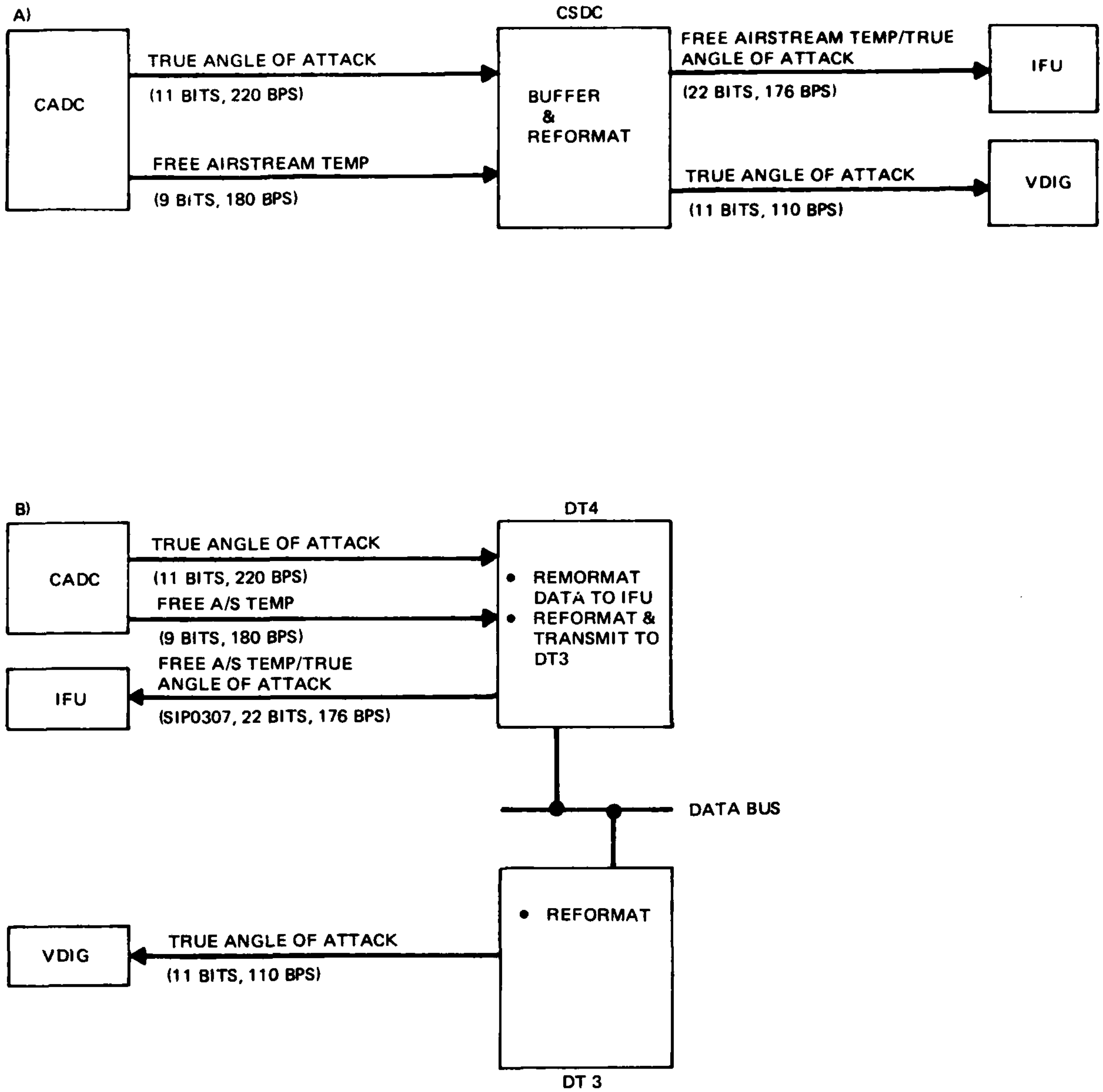


Figure 1 True Airspeed A/Mach No. 2



2184-045W

Figure 2 Command Airspeed/Error

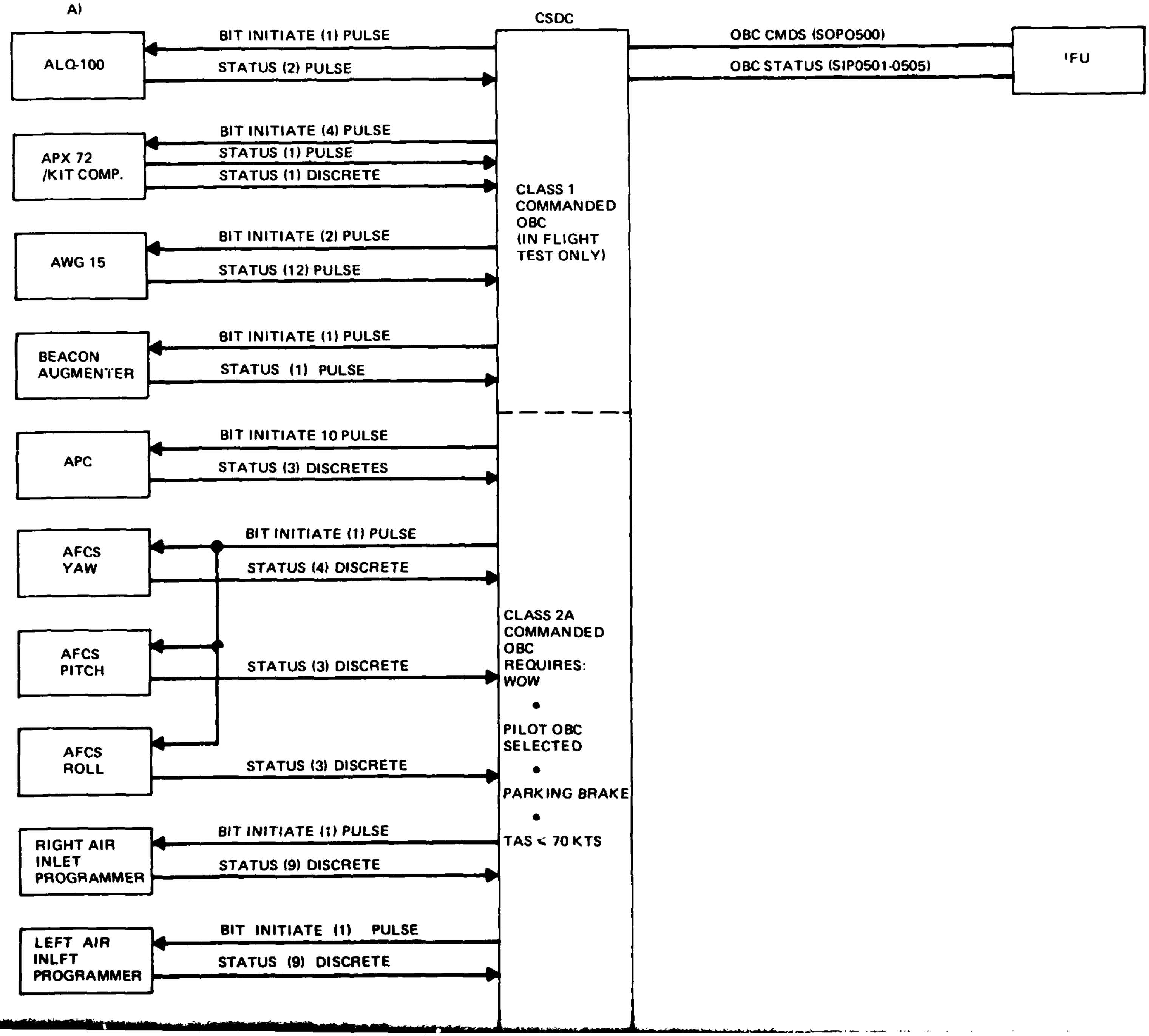


DATA BUS INFORMATION TRANSFER
DT4 TO DT 3 – TRUE ANGLE OF ATTACK (11 BITS, 110 BPS)

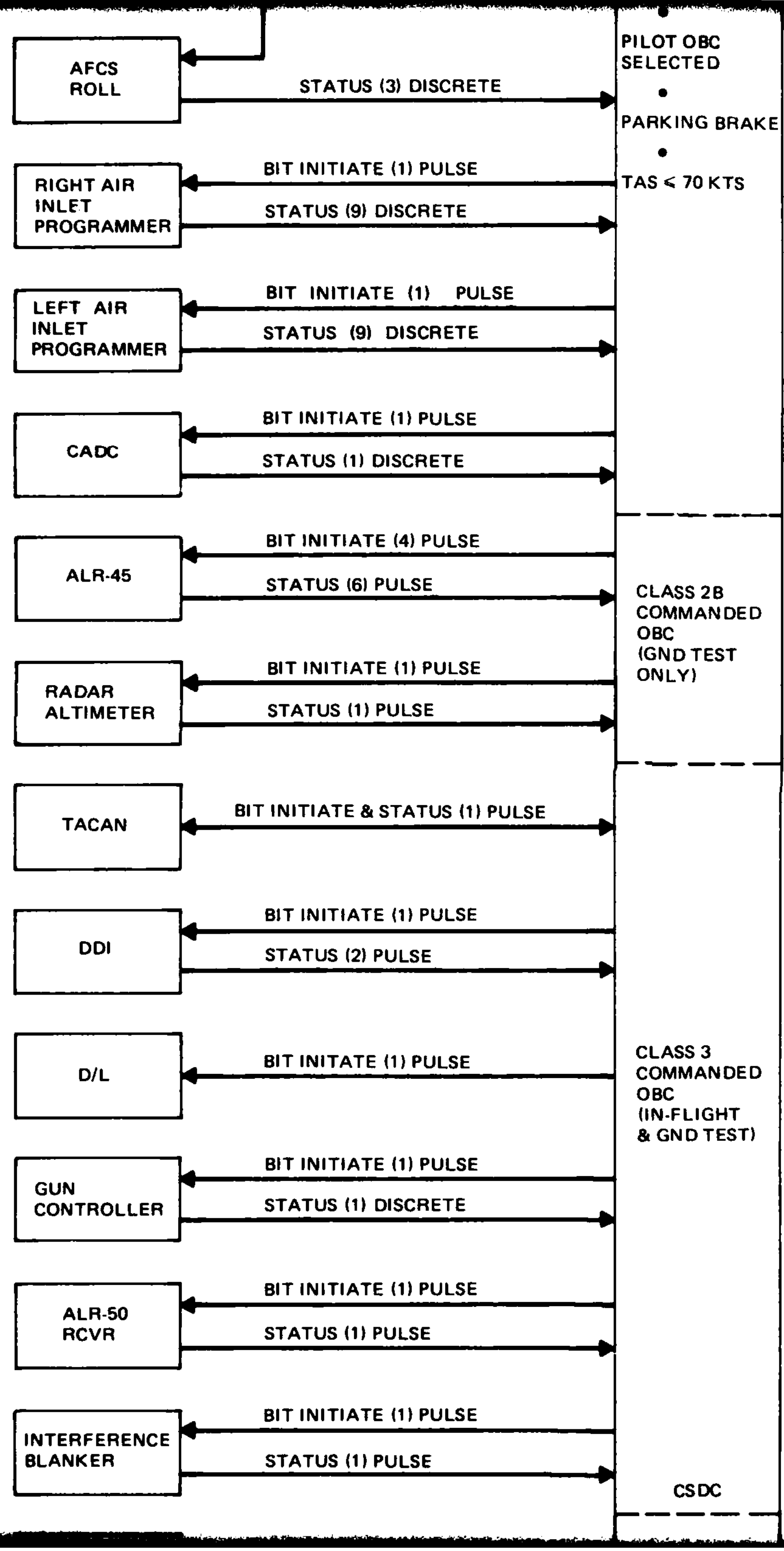
2184-046W

Figure 3 Free Airstream Temp/True Angle of Attack

A)


CSDC
IFU
OBC CMDS (SOPO500)
OBC STATUS (SIP0501-0505)
ALQ-100
BIT INITIATE (1) PULSE
STATUS (2) PULSE
APX 72
/KIT COMP.
BIT INITIATE (4) PULSE
STATUS (1) PULSE
STATUS (1) DISCRETE
AWG 15
BIT INITIATE (2) PULSE
STATUS (12) PULSE
BEACON
AUGMENTER
BIT INITIATE (1) PULSE
STATUS (1) PULSE
CLASS 1
COMMANDED
OBC
(IN FLIGHT
TEST ONLY)
APC
BIT INITIATE 10 PULSE
STATUS (3) DISCRETES
AFCS
YAW
BIT INITIATE (1) PULSE
STATUS (4) DISCRETE
AFCS
PITCH
STATUS (3) DISCRETE
AFCS
ROLL
STATUS (3) DISCRETE
CLASS 2A
COMMANDED
OBC
REQUIRES:
WOW
•
PILOT OBC
SELECTED
•
PARKING BRAKE
•
TAS < 70 KTS
RIGHT AIR
INLET
PROGRAMMER
BIT INITIATE (1) PULSE
STATUS (9) DISCRETE
LEFT AIR
INLFT
PROGRAMMER
BIT INITIATE (1) PULSE
STATUS (9) DISCRETE

2184-047W



AFCS ROLL
STATUS (3) DISCRETE
PILOT OBC SELECTED
PARKING BRAKE
TAS ≤ 70 KTS
RIGHT AIR INLET PROGRAMMER
BIT INITIATE (1) PULSE
STATUS (9) DISCRETE
LEFT AIR INLET PROGRAMMER
BIT INITIATE (1) PULSE
STATUS (9) DISCRETE
CADC
BIT INITIATE (1) PULSE
STATUS (1) DISCRETE
ALR-45
BIT INITIATE (4) PULSE
STATUS (6) PULSE
CLASS 2B COMMANDED OBC (GND TEST ONLY)
RADAR ALTIMETER
BIT INITIATE (1) PULSE
STATUS (1) PULSE
TACAN
BIT INITIATE & STATUS (1) PULSE
DDI
BIT INITIATE (1) PULSE
STATUS (2) PULSE
D/L
BIT INITATE (1) PULSE
CLASS 3 COMMANDED OBC (IN-FLIGHT & GND TEST)
GUN CONTROLLER
BIT INITIATE (1) PULSE
STATUS (1) DISCRETE
ALR-50 RCVR
BIT INITIATE (1) PULSE
STATUS (1) PULSE
INTERFERENCE BLANKER
BIT INITIATE (1) PULSE
STATUS (1) PULSE
CSDC

2

3

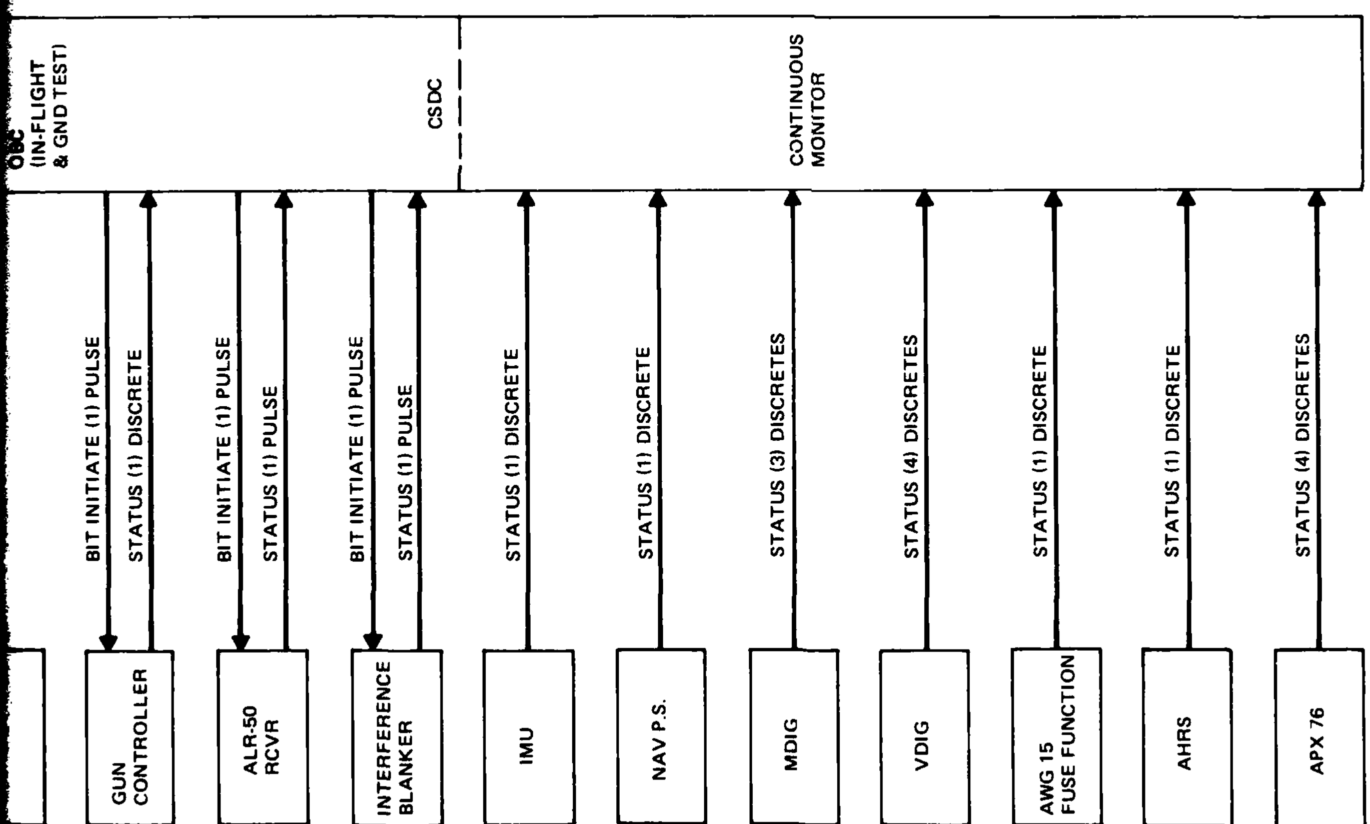
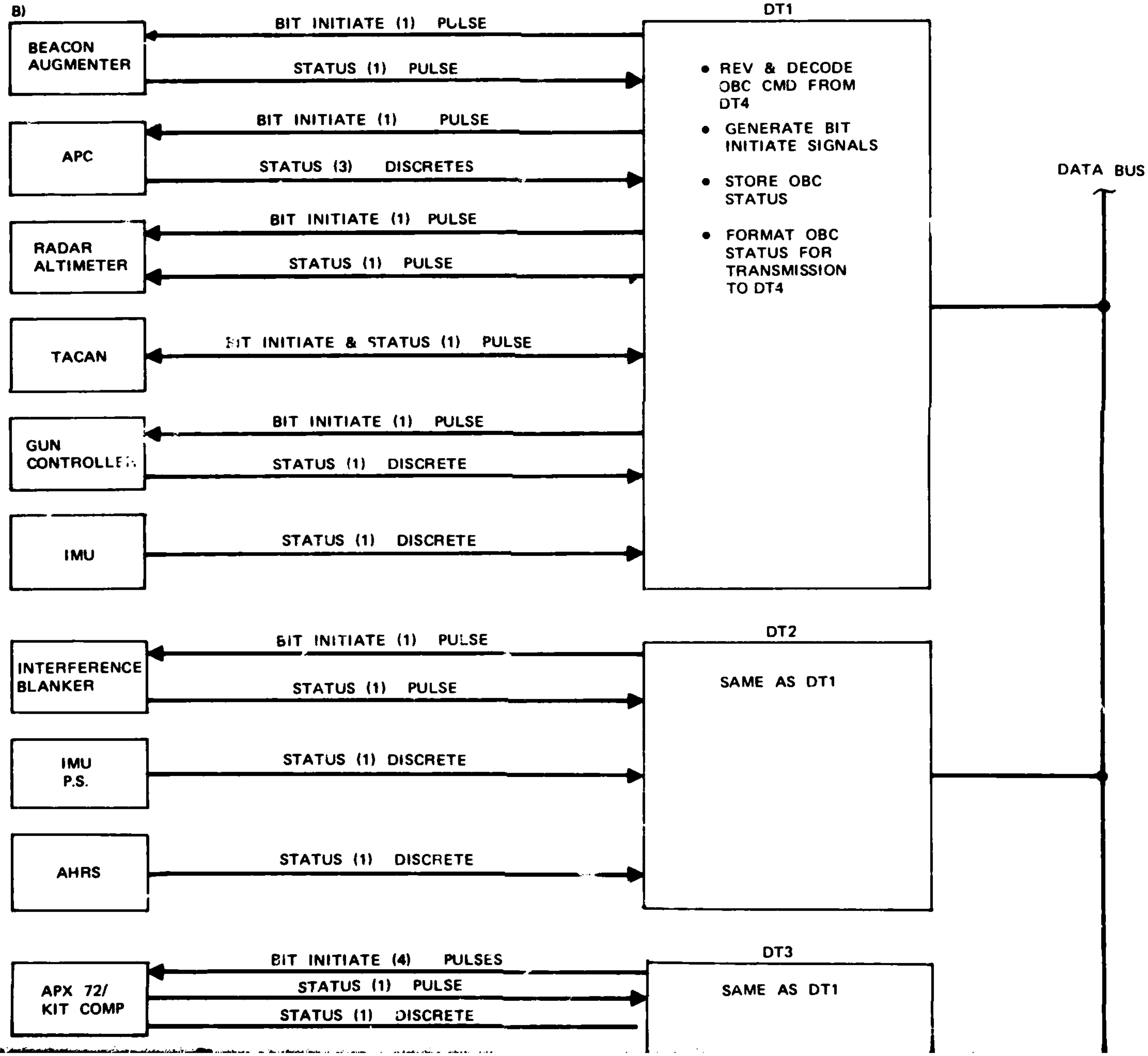
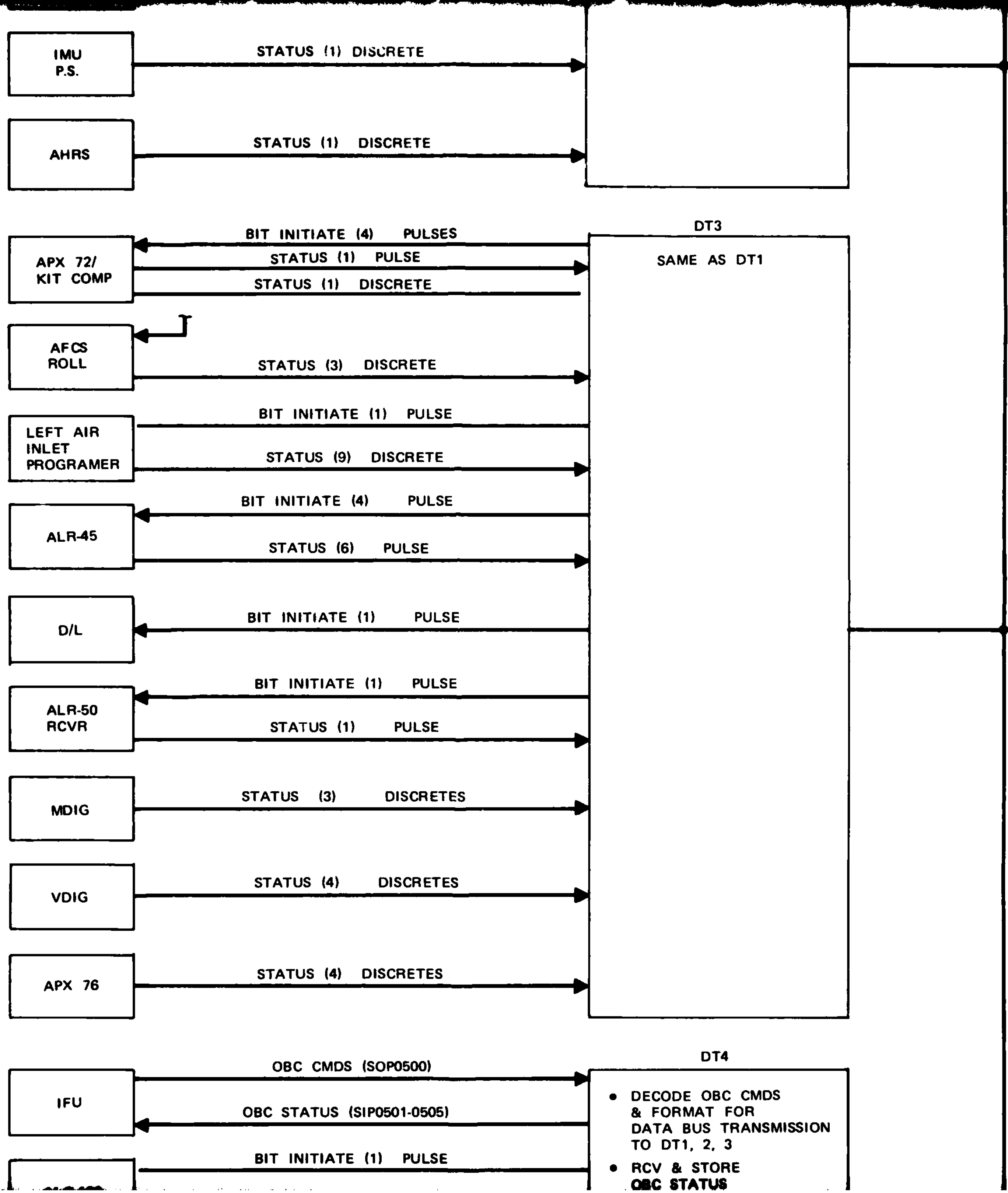


Figure 4 OBC

B)


BEACON AUGMENTER
BIT INITIATE (1) PULSE
STATUS (1) PULSE
APC
BIT INITIATE (1) PULSE
STATUS (3) DISCRETES
RADAR ALTIMETER
BIT INITIATE (1) PULSE
STATUS (1) PULSE
TACAN
BIT INITIATE & STATUS (1) PULSE
GUN CONTROLLER
BIT INITIATE (1) PULSE
STATUS (1) DISCRETE
IMU
STATUS (1) DISCRETE
DT1
• REV & DECODE OBC CMD FROM DT4
• GENERATE BIT INITIATE SIGNALS
• STORE OBC STATUS
• FORMAT OBC STATUS FOR TRANSMISSION TO DT4
DATA BUS
INTERFERENCE BLANKER
BIT INITIATE (1) PULSE
STATUS (1) PULSE
IMU P.S.
STATUS (1) DISCRETE
AHRS
STATUS (1) DISCRETE
DT2
SAME AS DT1
APX 72/ KIT COMP
BIT INITIATE (4) PULSES
STATUS (1) PULSE
STATUS (1) DISCRETE
DT3
SAME AS DT1


IMU P.S.
STATUS (1) DISCRETE
AHRS
STATUS (1) DISCRETE
DT3
SAME AS DT1
APX 72/ KIT COMP
BIT INITIATE (4) PULSES
STATUS (1) PULSE
STATUS (1) DISCRETE
AFCS ROLL
STATUS (3) DISCRETE
LEFT AIR INLET PROGRAMER
BIT INITIATE (1) PULSE
STATUS (9) DISCRETE
ALR-45
BIT INITIATE (4) PULSE
STATUS (6) PULSE
D/L
BIT INITIATE (1) PULSE
ALR-50 RCVR
BIT INITIATE (1) PULSE
STATUS (1) PULSE
MDIG
STATUS (3) DISCRETES
VDIG
STATUS (4) DISCRETES
APX 76
STATUS (4) DISCRETES
DT4
IFU
OBC CMDS (SOP0500)
OBC STATUS (SIP0501-0505)
BIT INITIATE (1) PULSE
• DECODE OBC CMDS & FORMAT FOR DATA BUS TRANSMISSION TO DT1, 2, 3
• RCV & STORE OBC STATUS

3

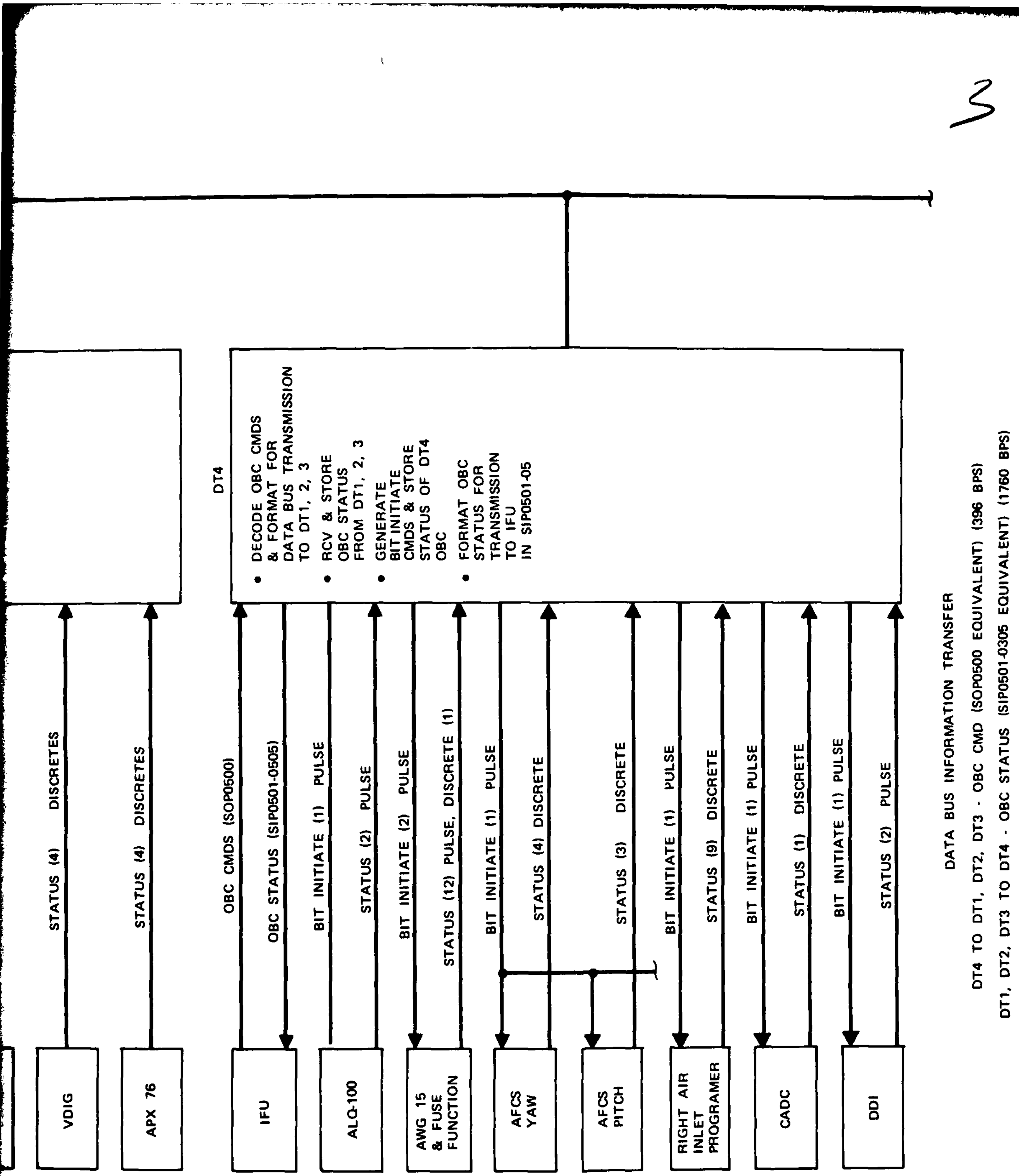


Figure 4 OBC (Cont.)

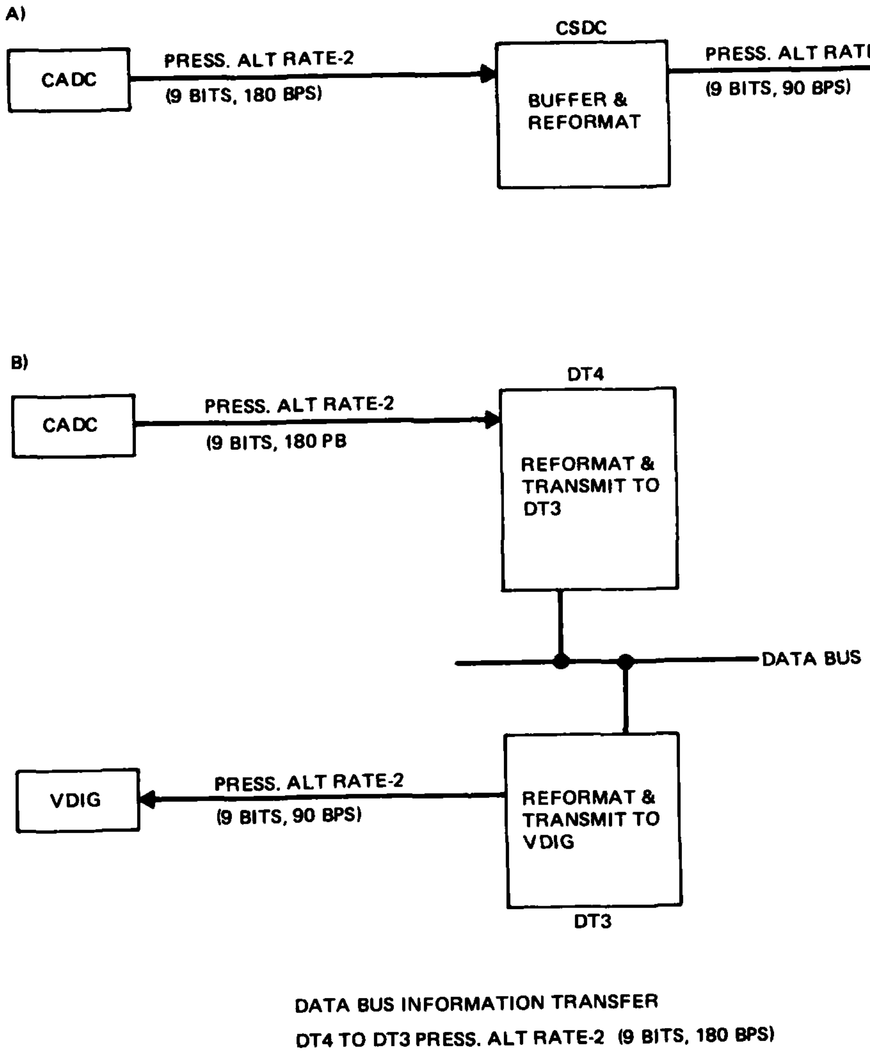


Figure 5 Pressure Altitude Rate -2

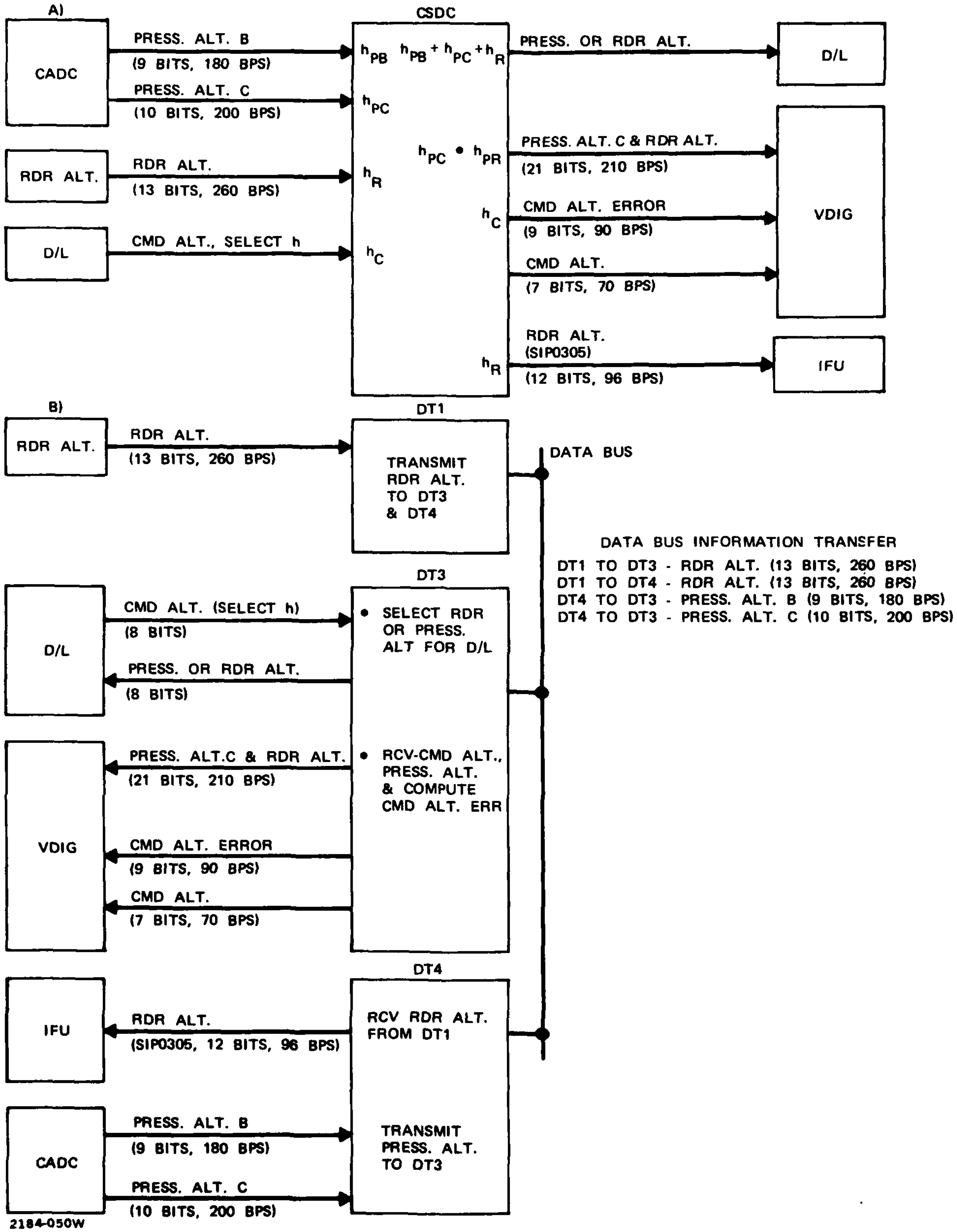


Figure 6 Command Altitude Error, Command Altitude, Pressure Altitude, Radar Altitude

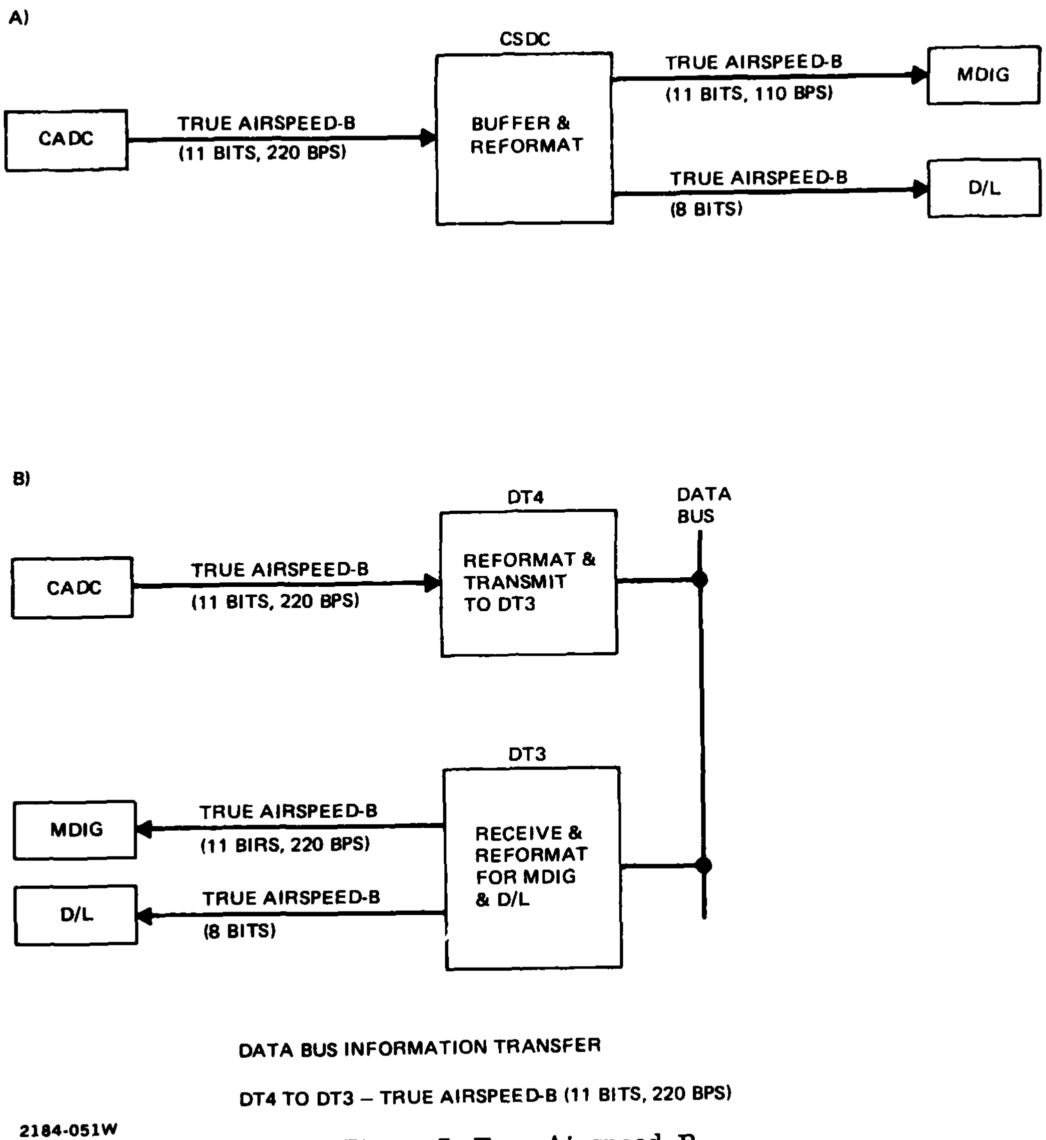
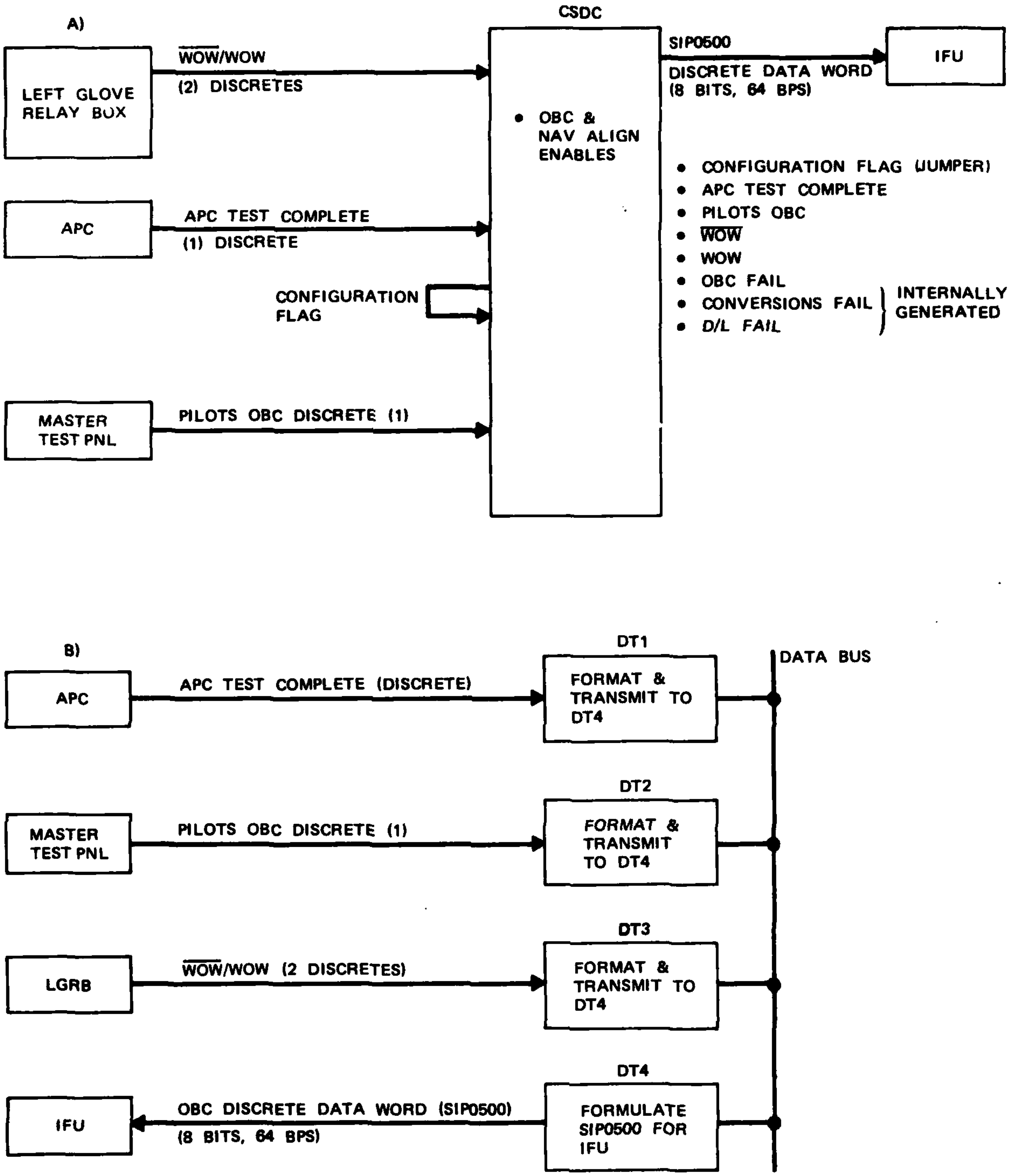


Figure 7 True Airspeed–B



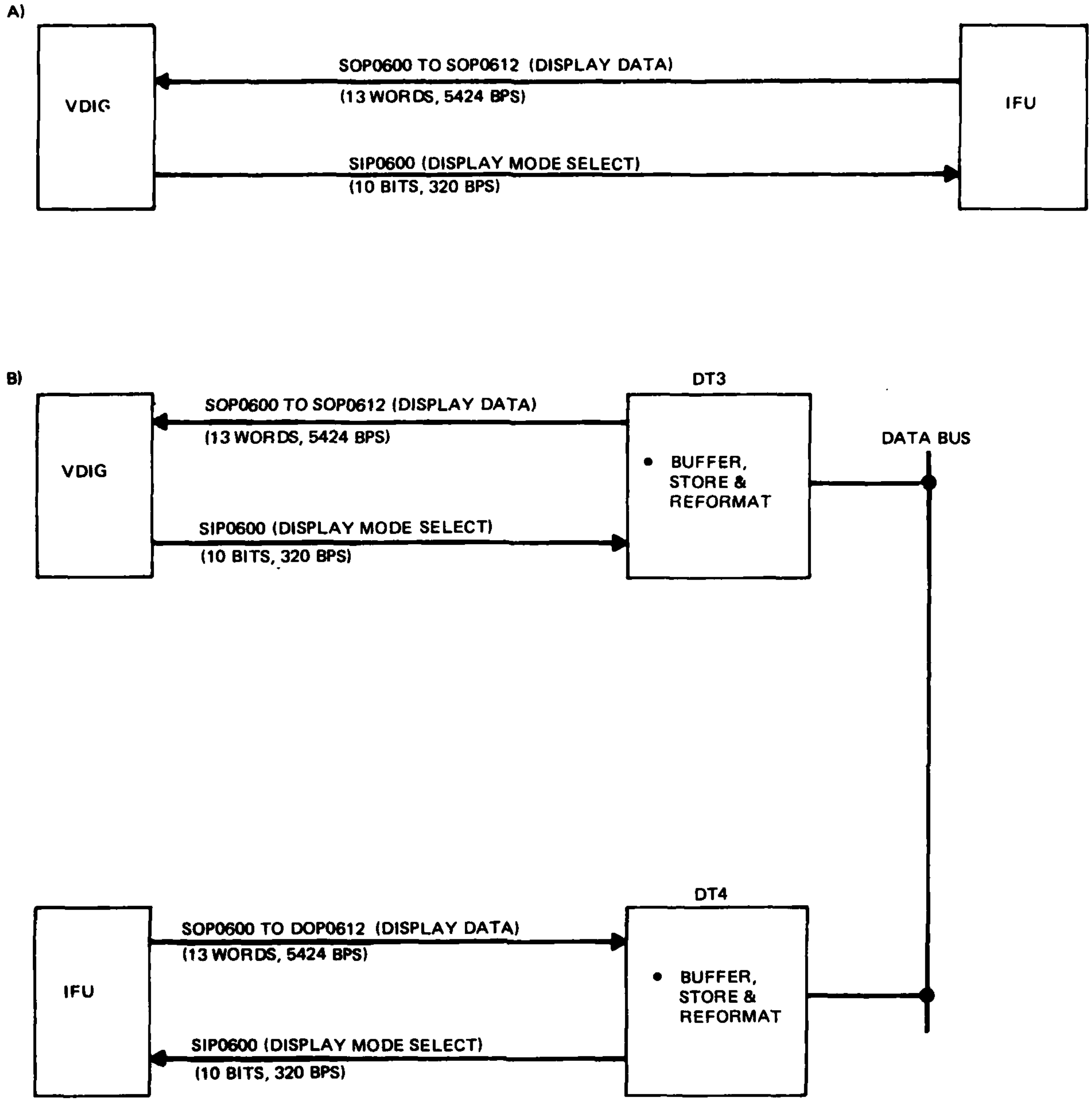
DATA BUS INFORMATION TRANSFER

DT1 TO DT2	(4 BITS, 32 BPS)	DISCRETES
DT2 TO DT4	(4 BITS, 32 BPS)	DISCRETES
DT3 TO DT4	(4 BITS, 32 BPS)	DISCRETES

2184-052W

Figure 8 SIP0500 - OBC Discrete Data Word

5916-52



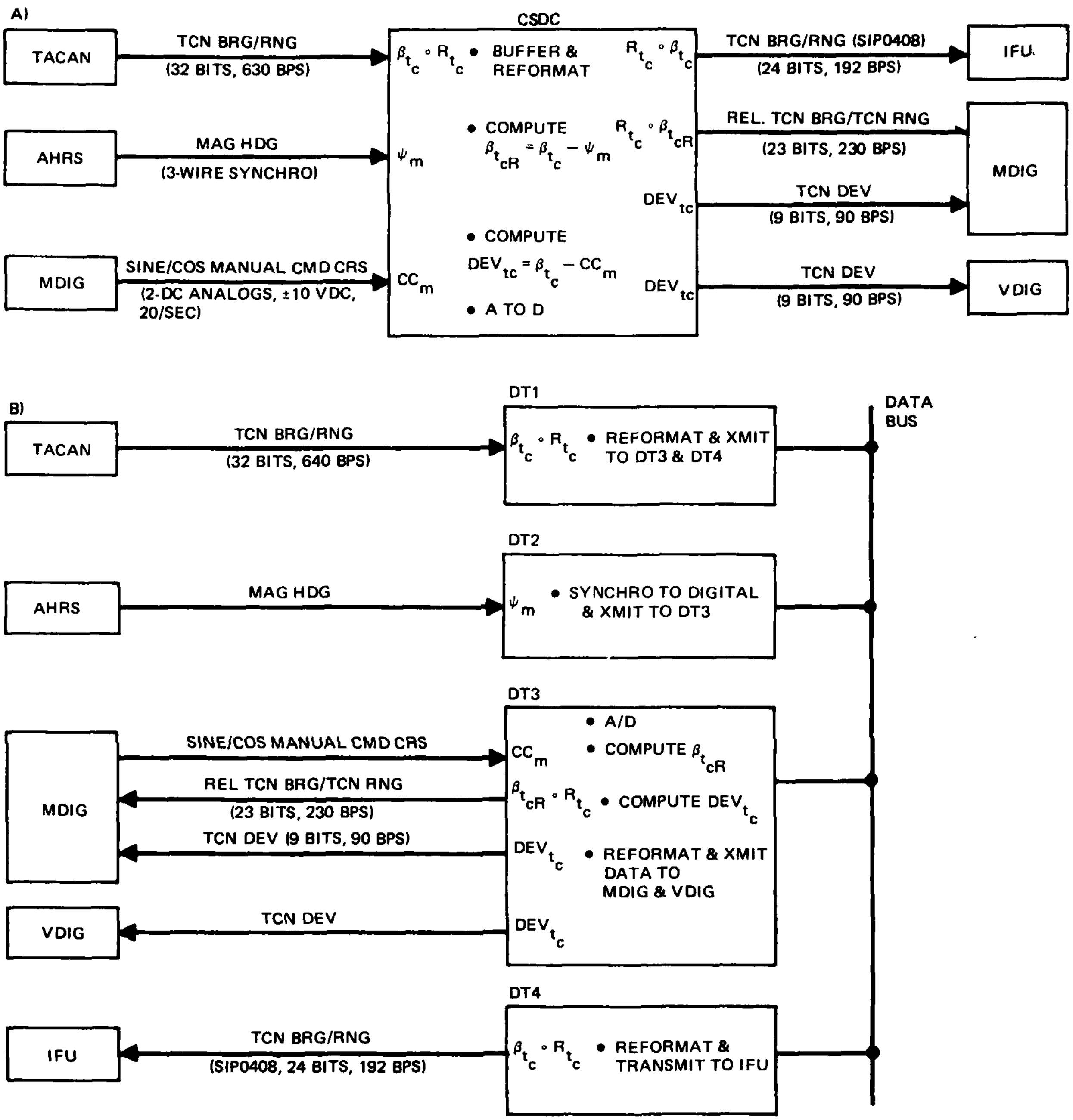
DATA BUS INFORMATION TRANSFER

DT4 TO DT3 – SOP0600 TO SOP0612 (13 WORDS, 9 TO 24 BITS/WORD, 5424 BPS)

DT3 TO DT4 – SIP0600 (10 BITS, 320 BPS)

2184-053W

Figure 9 VDIG/IFU SIP/SOP06



DATA BUS INFORMATION TRANSFER

DT1 TO DT3 TCN BRG/RNG (32 BITS, 640 BPS)
DT1 TO DT4 TCN BRG/RNG (32 BITS, 640 BPS)
DT2 TO DT3 MAG HDG (16 BITS, 320 BPS)

Figure 10 TACAN Bearing/Range, TACAN Deviation, Relative TACAN Bearing Angle

2184-054W

5916-54

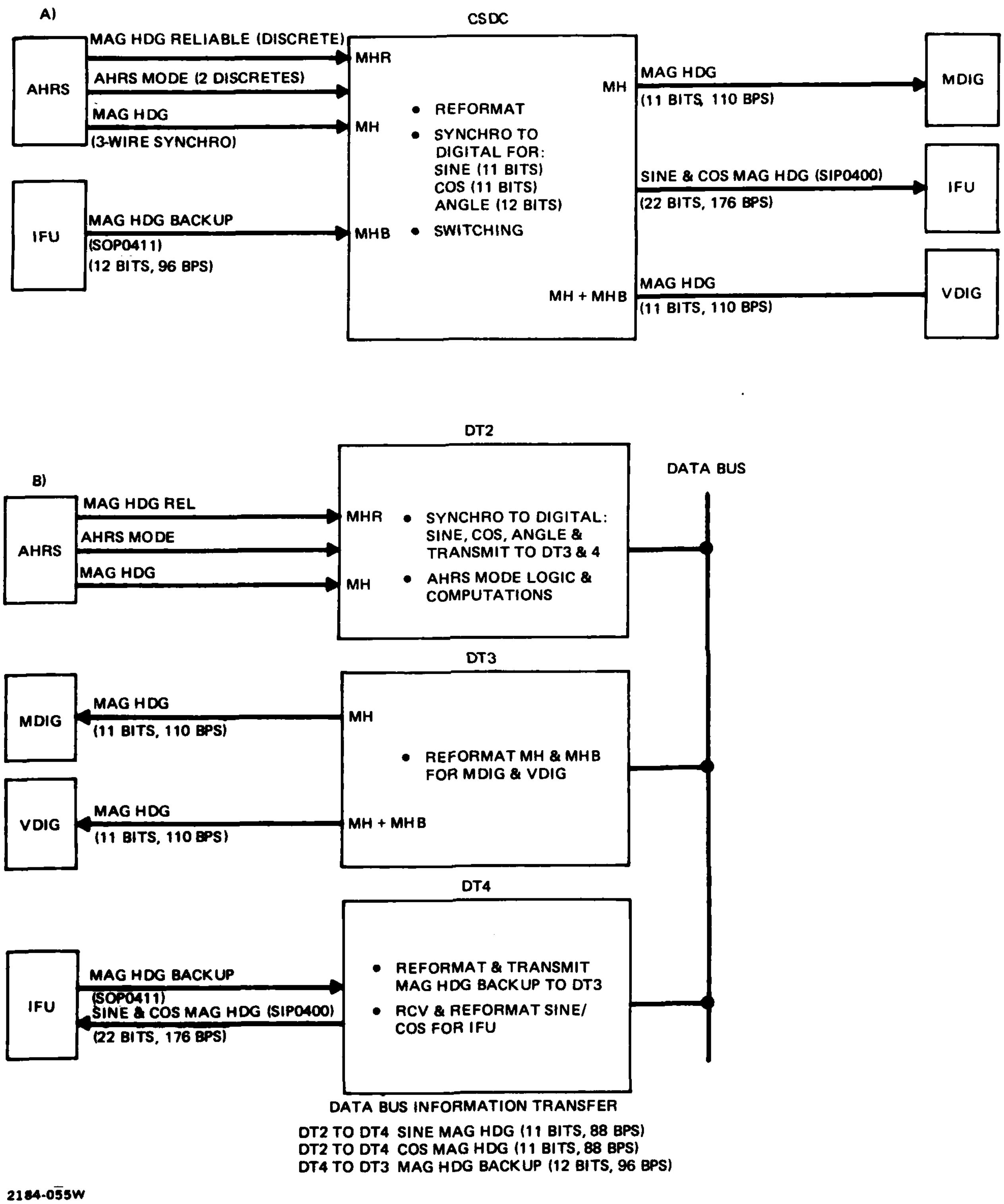


Figure 11 Magnetic Heading, Sine and Cos Magnetic Heading

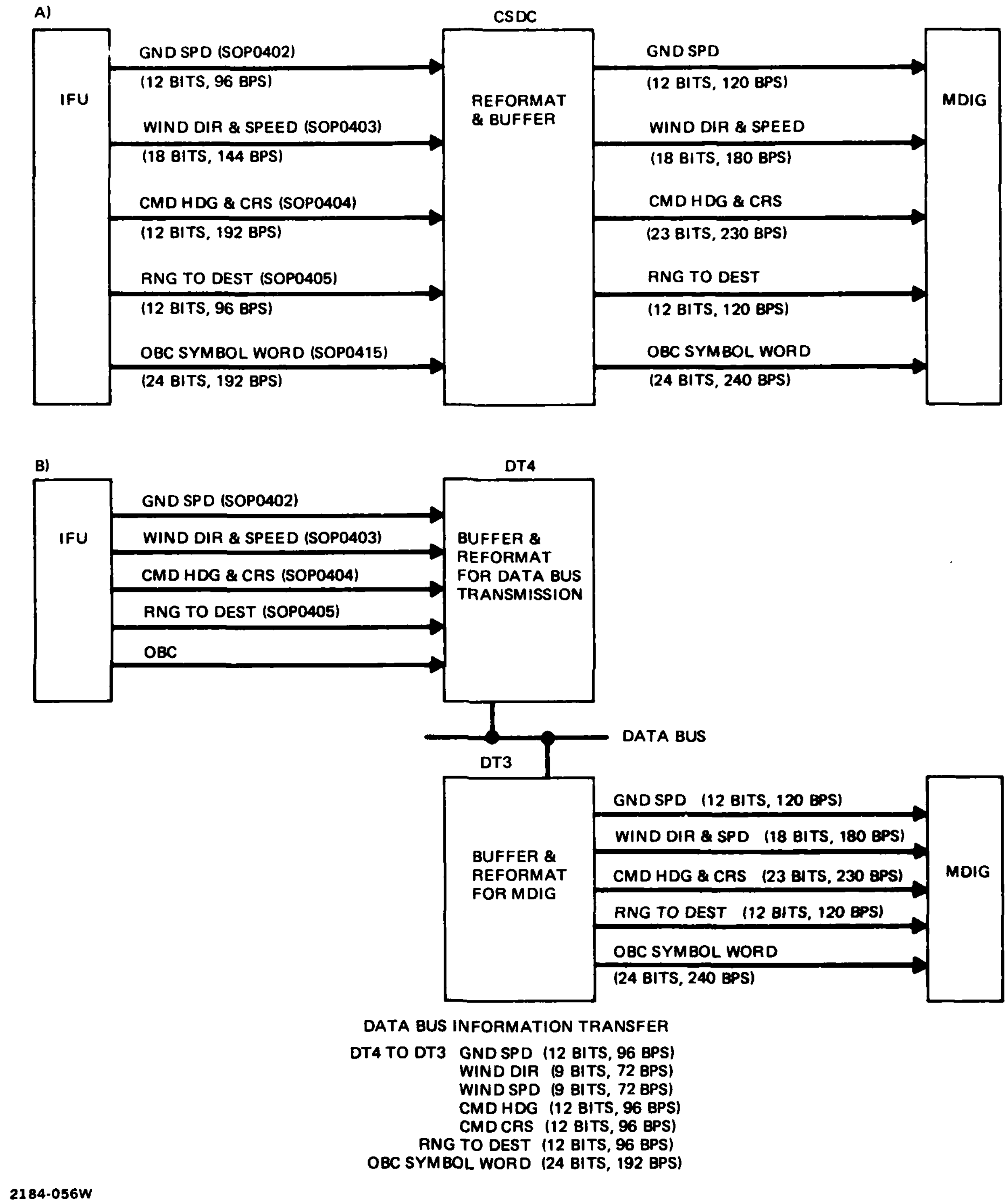


Figure 12 Range to Destination, OBC Symbol Word, Groundspeed, Wind Direction, Wind Speed, Command Heading, Command Course

5916-56

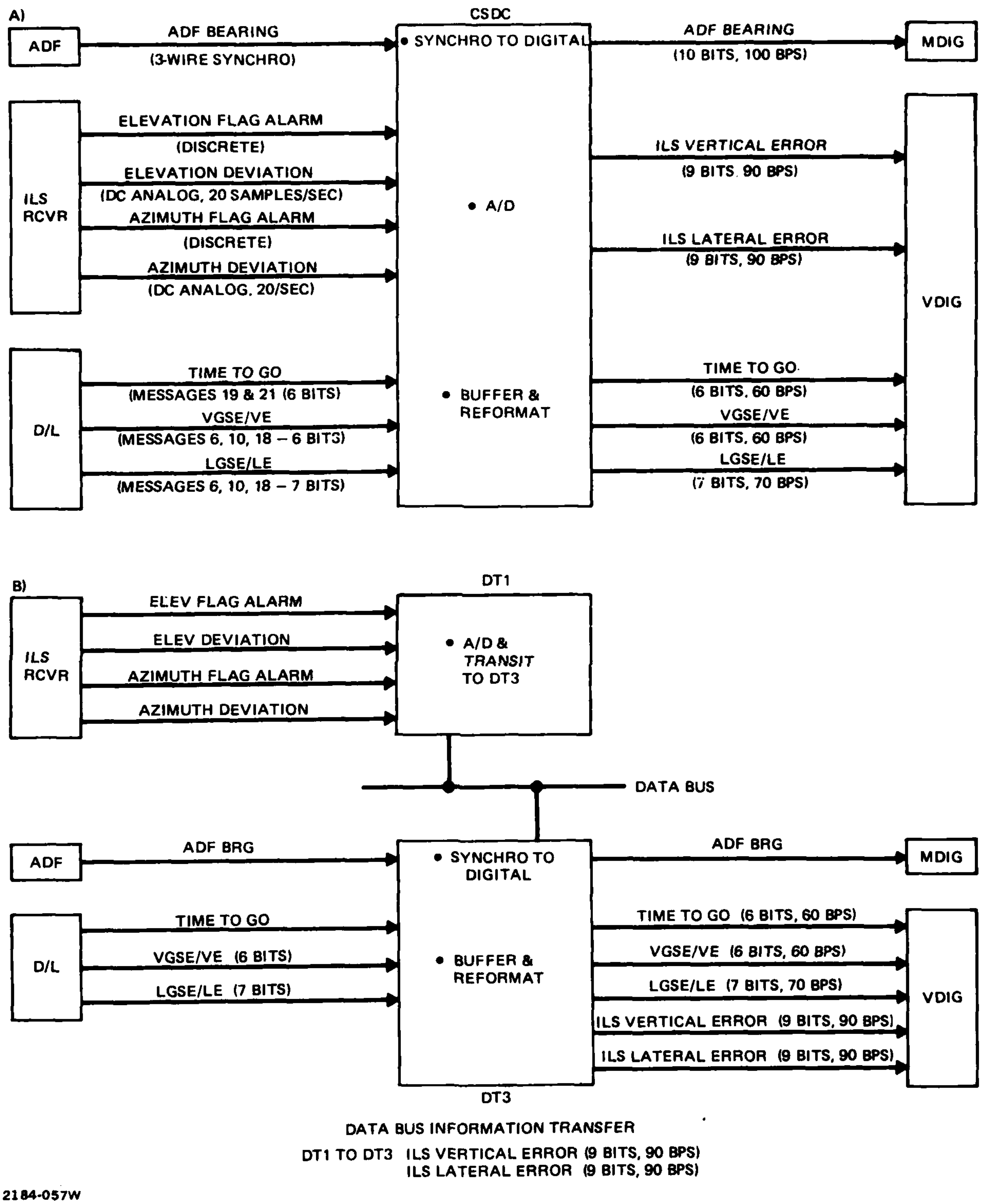


Figure 13 ADF Bearing ILS Vertical Error, ILS Lateral Error, Time to Go, Vertical Guide Slope Error/Vertical Error, Lateral Guide Slope Error/Lateral Error

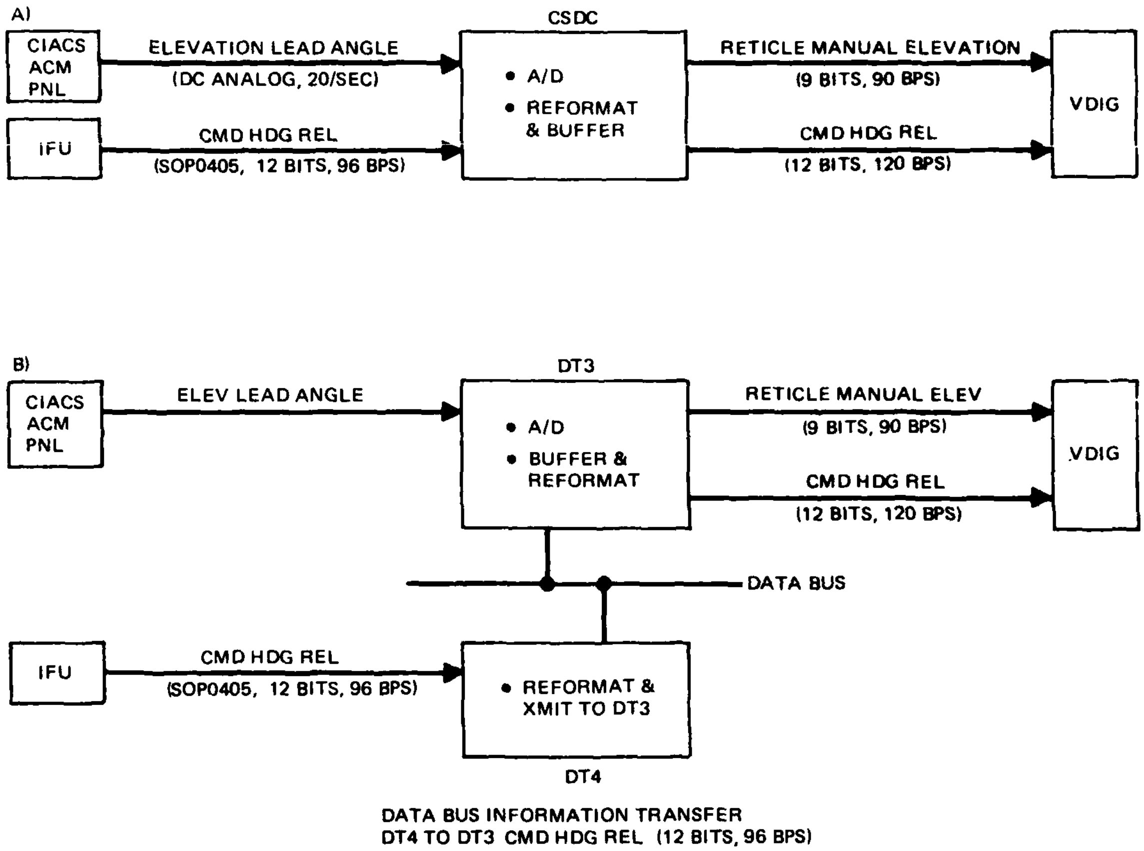
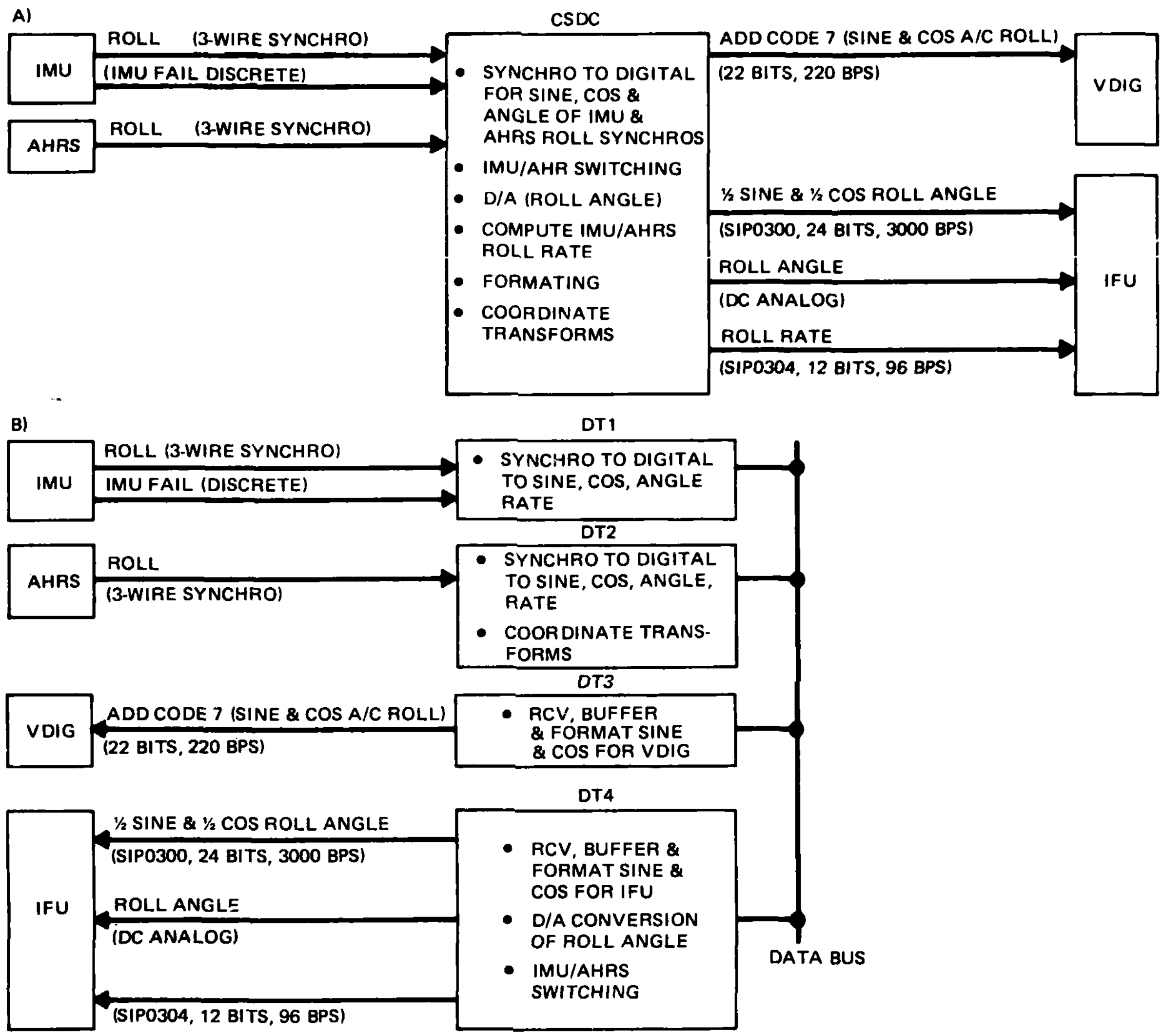


Figure 14 Reticle Manual Elevation, Command Heading Reliable

2184-058W

5916-58



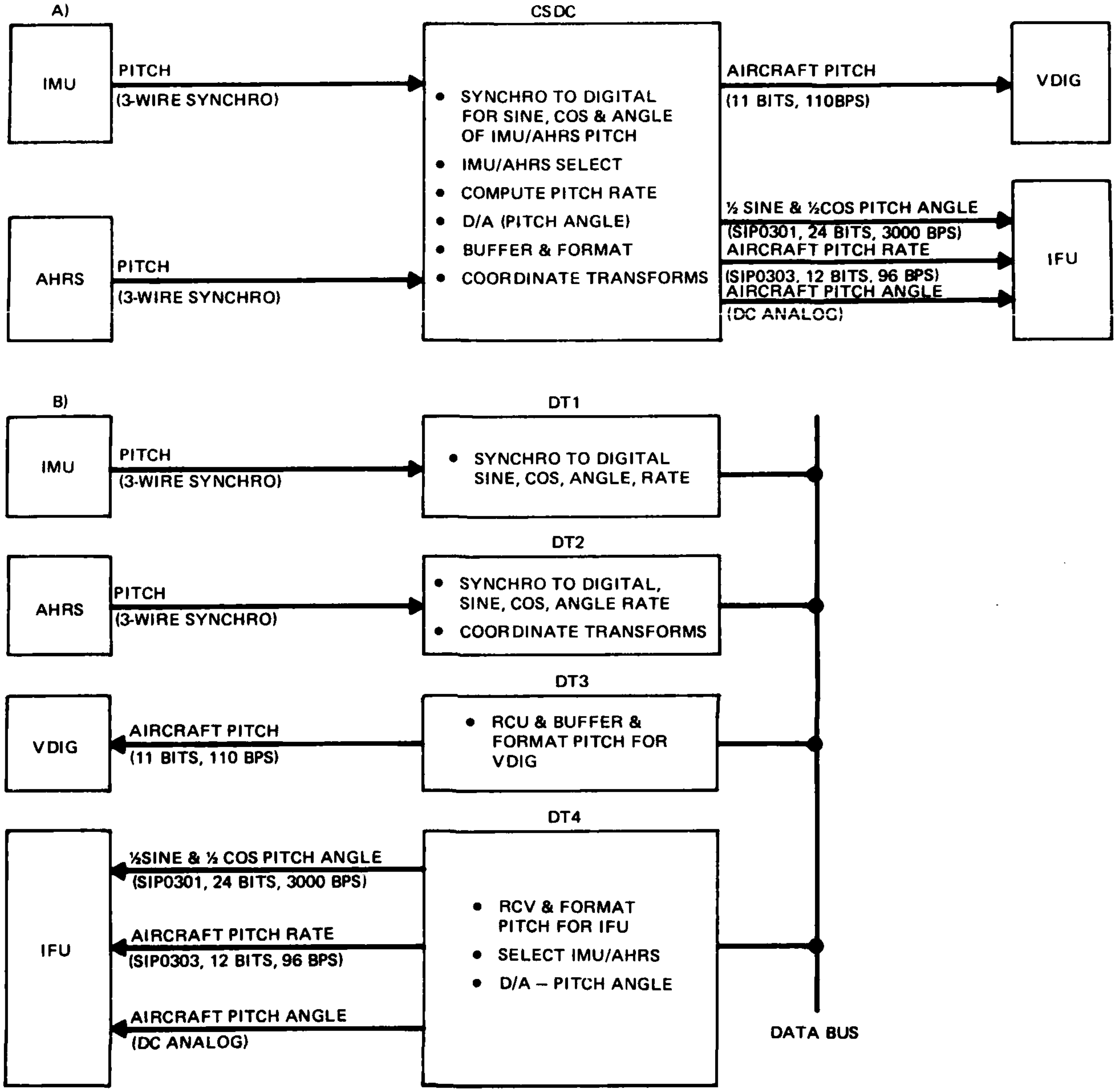
DATA BUS INFORMATION TRANSFER

DT1 TO DT2	IMU – SINE & COS ROLL (24 BITS, 3000 BPS)
DT1 TO DT3	IMU – SINE & COS A/C ROLL (22 BITS, 220 BPS)
DT1 TO DT4	IMU – ½ SINE & ½ COS ROLL (24 BITS, 3000 BPS)
	IMU – ROLL RATE (12 BITS, 96 BPS)
DT2 TO DT3	AHRS – SINE & COS A/C ROLL (22 BITS, 220 BPS)
DT2 TO DT4	AHRS – ½ SINE & ½ COS ROLL (24 BITS, 3000 BPS)
	AHRS – ROLL RATE (12 BITS 96 BPS)

2184-059W

Figure 15 Sine and Cos Aircraft Roll, Roll Angle and Rate

5916-59

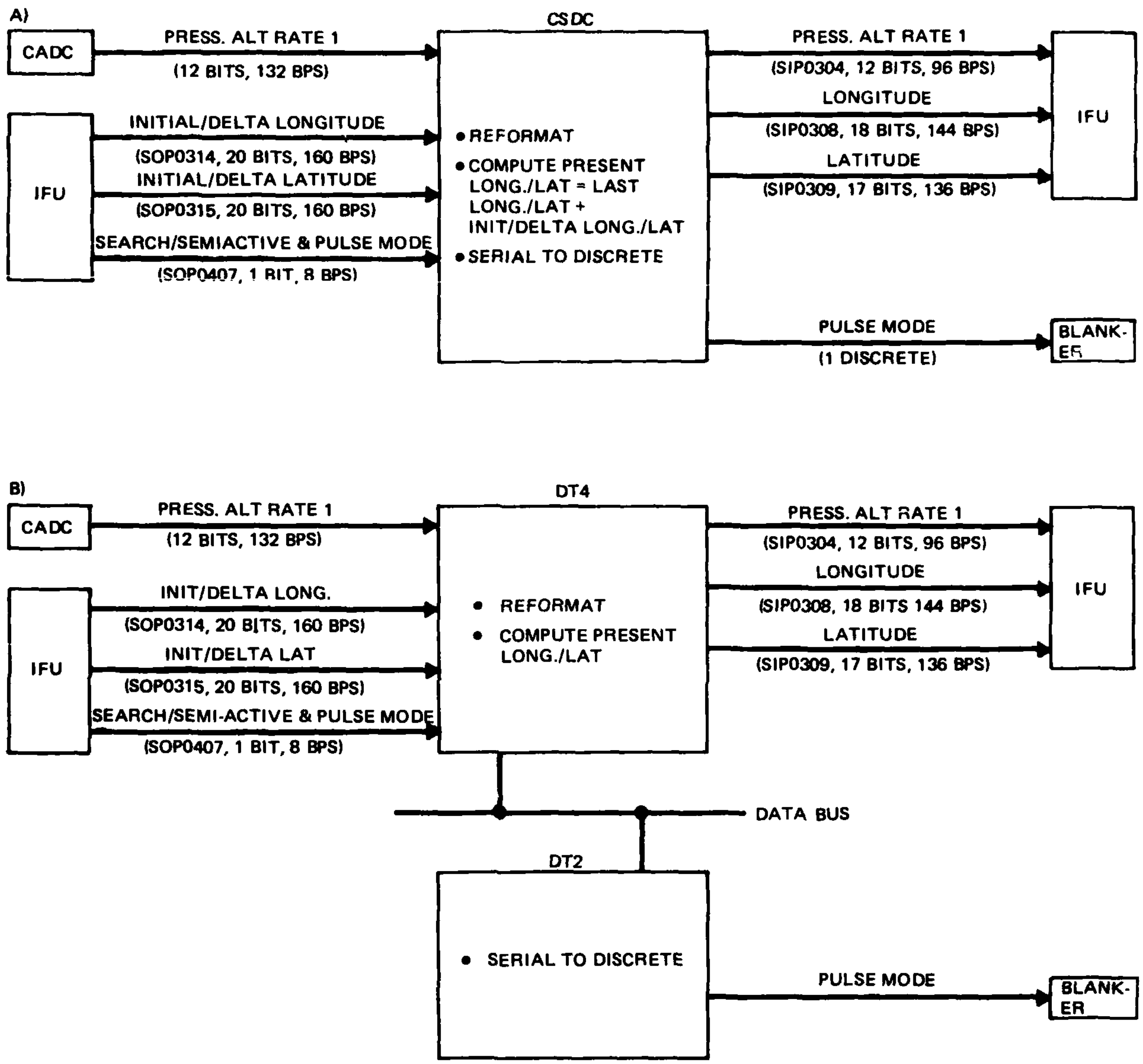


DATA BUS INFORMATION TRANSFER

DT1 TO DT2	IMU – SINE & COS PITCH (24 BITS, 3000 BPS)
DT1 TO DT3	IMU – A/C PITCH (12 BITS, 120 BPS)
DT1 TO DT4	IMU – ½ SINE & ½ COS PITCH (24 BITS, 300 BPS)
DT1 TO DT4	IMU – PITCH RATE (12 BITS, 96 BPS)
DT2 TO DT3	AHRS – A/C PITCH (11 BITS, 110 BPS)
DT2 TO DT4	AHRS – ½ SINE & ½ COS PITCH (24 BITS, 3000 BPS)
	AHRS – PITCH RATE (12 BITS, 96 BPS)
	AHRS – PITCH ANGLE (12 BITS, 96 BPS)

2184-060W

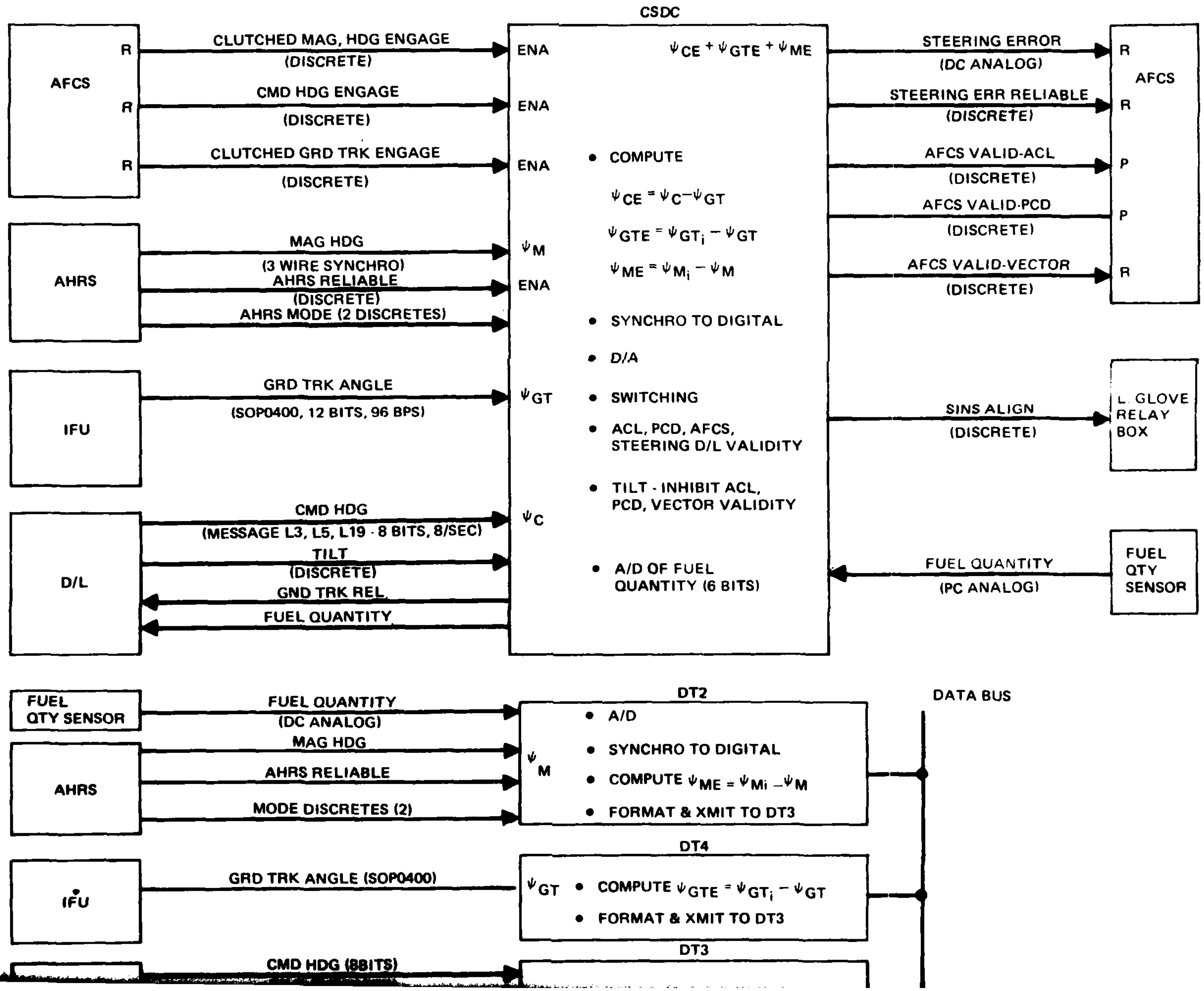
Figure 16 Sine and Cos Aircraft Pitch, Pitch Angle and Rate



DATA BUS INFORMATION TRANSFER
DT4 TO DT2 PULSE MODE (1 BIT, 8 BPS)

2184-062W

Figure 18 Search/Semi-Active Mode, Pressure Altitude Rate 1, Longitude/Latitude



AFCS
R
R
R
CLUTCHED MAG, HDG ENGAGE
(DISCRETE)
CMD HDG ENGAGE
(DISCRETE)
CLUTCHED GRD TRK ENGAGE
(DISCRETE)
AHRS
MAG HDG
(3 WIRE SYNCHRO)
AHRS RELIABLE
(DISCRETE)
AHRS MODE (2 DISCRETES)
IFU
GRD TRK ANGLE
(SOP0400, 12 BITS, 96 BPS)
D/L
CMD HDG
(MESSAGE L3, L5, L19 - 8 BITS, 8/SEC)
TILT
(DISCRETE)
GND TRK REL
FUEL QUANTITY
CSDC
ENA
ENA
ENA
ψ_M
ENA
ψ_{GT}
ψ_C
$\psi_{CE} + \psi_{GTE} + \psi_{ME}$
• COMPUTE
$\psi_{CE} = \psi_C - \psi_{GT}$
$\psi_{GTE} = \psi_{GT_i} - \psi_{GT}$
$\psi_{ME} = \psi_{M_i} - \psi_M$
• SYNCHRO TO DIGITAL
• D/A
• SWITCHING
• ACL, PCD, AFCS, STEERING D/L VALIDITY
• TILT - INHIBIT ACL, PCD, VECTOR VALIDITY
• A/D OF FUEL QUANTITY (6 BITS)
STEERING ERROR
(DC ANALOG)
STEERING ERR RELIABLE
(DISCRETE)
AFCS VALID-ACL
(DISCRETE)
AFCS VALID-PCD
(DISCRETE)
AFCS VALID-VECTOR
(DISCRETE)
AFCS
R
R
P
P
R
SINS ALIGN
(DISCRETE)
L. GLOVE RELAY BOX
FUEL QUANTITY
(PC ANALOG)
FUEL QTY SENSOR
FUEL QTY SENSOR
FUEL QUANTITY
(DC ANALOG)
AHRS
MAG HDG
AHRS RELIABLE
MODE DISCRETES (2)
DT2
ψ_M
• A/D
• SYNCHRO TO DIGITAL
• COMPUTE $\psi_{ME} = \psi_{Mi} - \psi_M$
• FORMAT & XMIT TO DT3
DATA BUS
IFU
GRD TRK ANGLE (SOP0400)
DT4
ψ_{GT}
• COMPUTE $\psi_{GTE} = \psi_{GT_i} - \psi_{GT}$
• FORMAT & XMIT TO DT3
CMD HDG (8BITS)
DT3

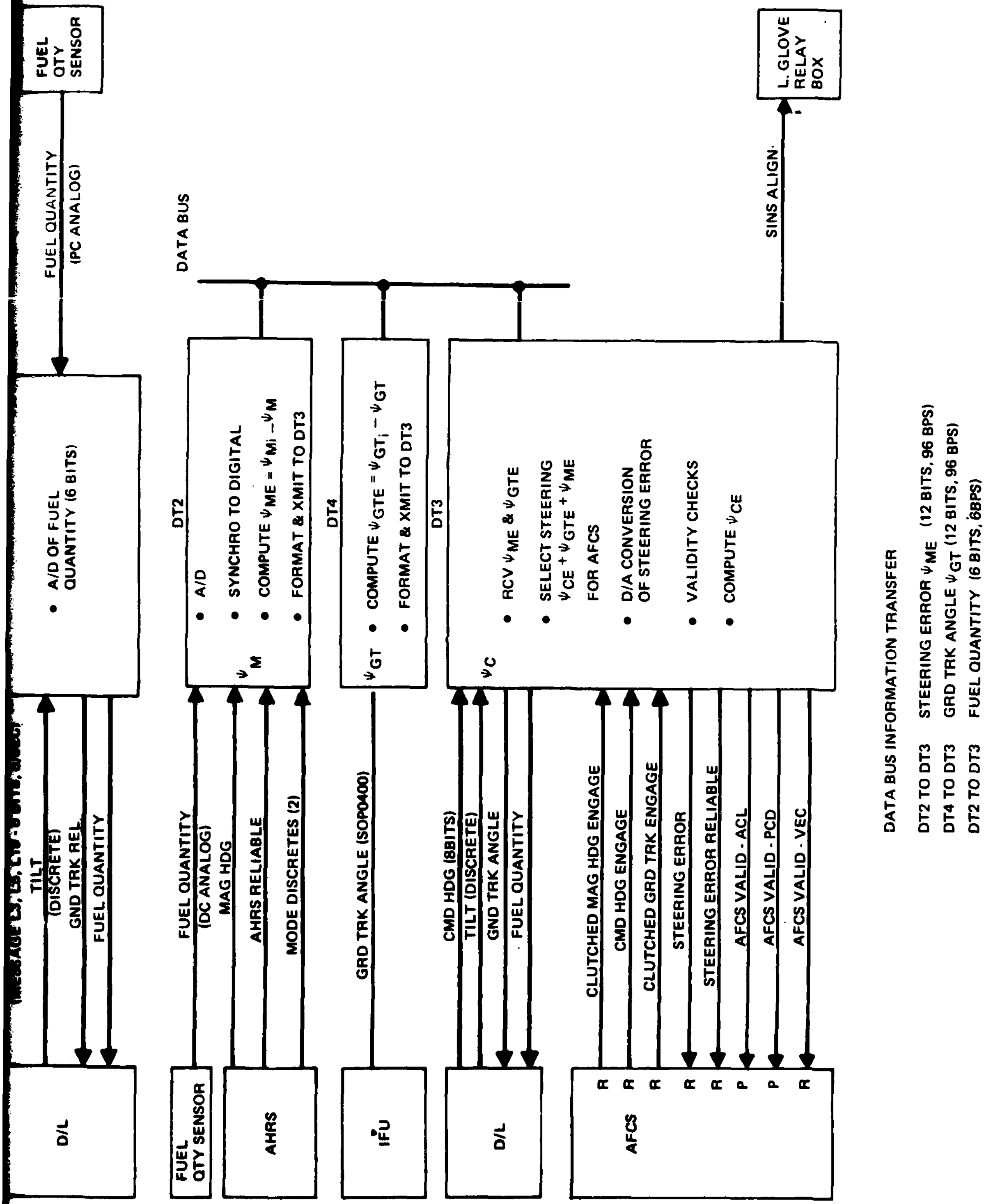
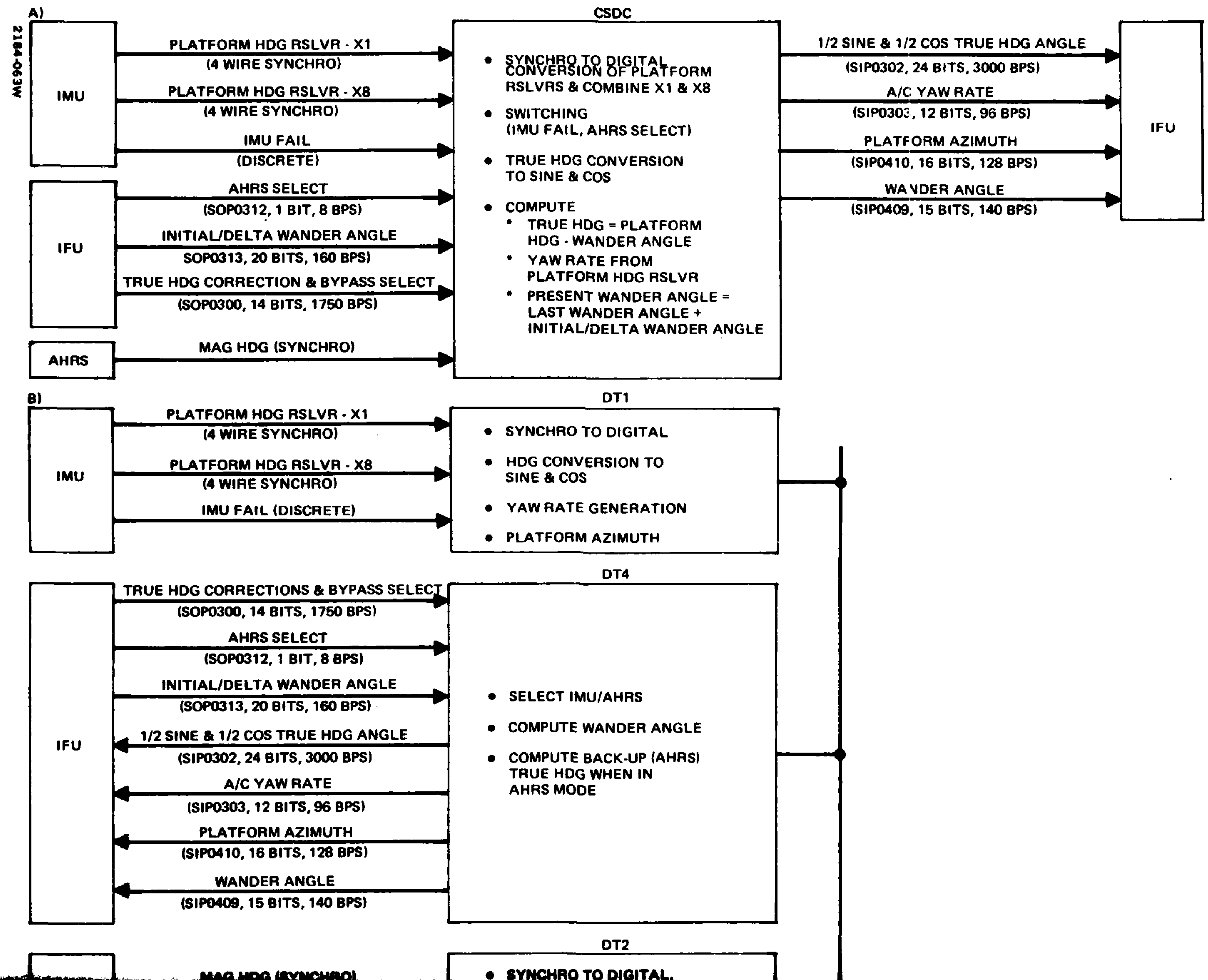


Figure 17 Steering Error and Discretes



2184-063W
A)
IMU
PLATFORM HDG RSLVR - X1
(4 WIRE SYNCHRO)
PLATFORM HDG RSLVR - X8
(4 WIRE SYNCHRO)
IMU FAIL
(DISCRETE)
IFU
AHRS SELECT
(SOP0312, 1 BIT, 8 BPS)
INITIAL/DELTA WANDER ANGLE
SOP0313, 20 BITS, 160 BPS)
TRUE HDG CORRECTION & BYPASS SELECT
(SOP0300, 14 BITS, 1750 BPS)
AHRS
MAG HDG (SYNCHRO)
CSDC
• SYNCHRO TO DIGITAL CONVERSION OF PLATFORM RSLVRS & COMBINE X1 & X8
• SWITCHING (IMU FAIL, AHRS SELECT)
• TRUE HDG CONVERSION TO SINE & COS
• COMPUTE
* TRUE HDG = PLATFORM HDG - WANDER ANGLE
* YAW RATE FROM PLATFORM HDG RSLVR
* PRESENT WANDER ANGLE = LAST WANDER ANGLE + INITIAL/DELTA WANDER ANGLE
1/2 SINE & 1/2 COS TRUE HDG ANGLE
(SIP0302, 24 BITS, 3000 BPS)
A/C YAW RATE
(SIP0303, 12 BITS, 96 BPS)
PLATFORM AZIMUTH
(SIP0410, 16 BITS, 128 BPS)
WANDER ANGLE
(SIP0409, 15 BITS, 140 BPS)
IFU
B)
IMU
PLATFORM HDG RSLVR - X1
(4 WIRE SYNCHRO)
PLATFORM HDG RSLVR - X8
(4 WIRE SYNCHRO)
IMU FAIL (DISCRETE)
DT1
• SYNCHRO TO DIGITAL
• HDG CONVERSION TO SINE & COS
• YAW RATE GENERATION
• PLATFORM AZIMUTH
IFU
TRUE HDG CORRECTIONS & BYPASS SELECT
(SOP0300, 14 BITS, 1750 BPS)
AHRS SELECT
(SOP0312, 1 BIT, 8 BPS)
INITIAL/DELTA WANDER ANGLE
(SOP0313, 20 BITS, 160 BPS)
1/2 SINE & 1/2 COS TRUE HDG ANGLE
(SIP0302, 24 BITS, 3000 BPS)
A/C YAW RATE
(SIP0303, 12 BITS, 96 BPS)
PLATFORM AZIMUTH
(SIP0410, 16 BITS, 128 BPS)
WANDER ANGLE
(SIP0409, 15 BITS, 140 BPS)
DT4
• SELECT IMU/AHRS
• COMPUTE WANDER ANGLE
• COMPUTE BACK-UP (AHRS) TRUE HDG WHEN IN AHRS MODE
DT2
MAG HDG (SYNCHRO)
• SYNCHRO TO DIGITAL,

2

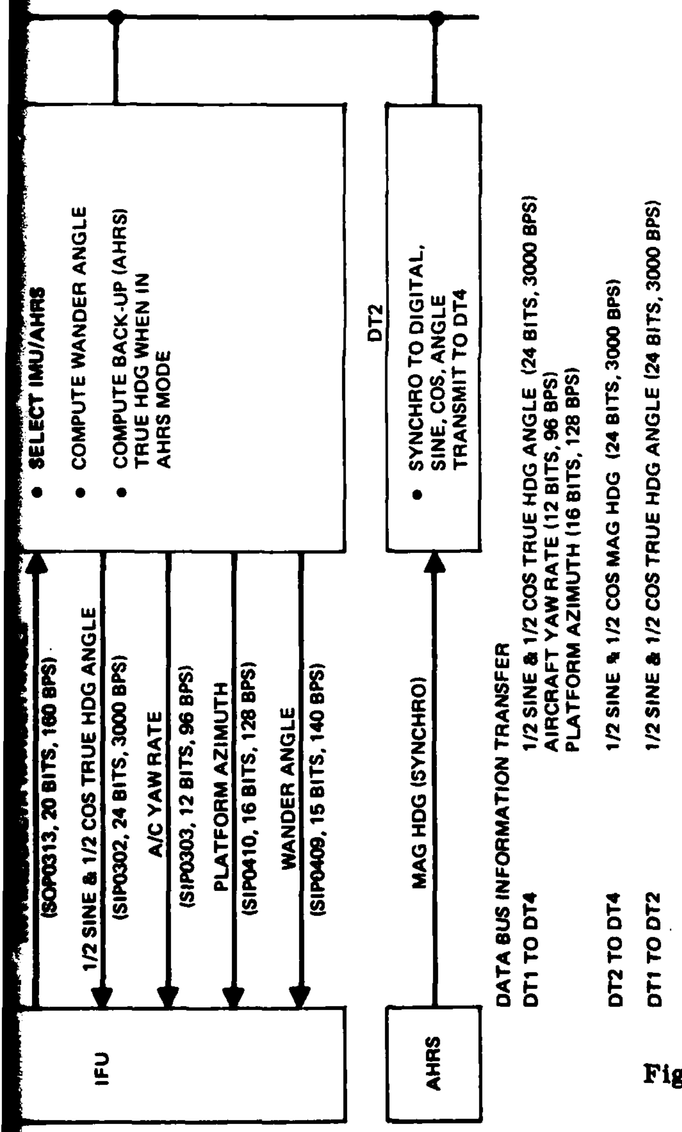


Figure 19 Sine and Cos Aircraft True Heading Angle, Yaw Rate, Wander Angle

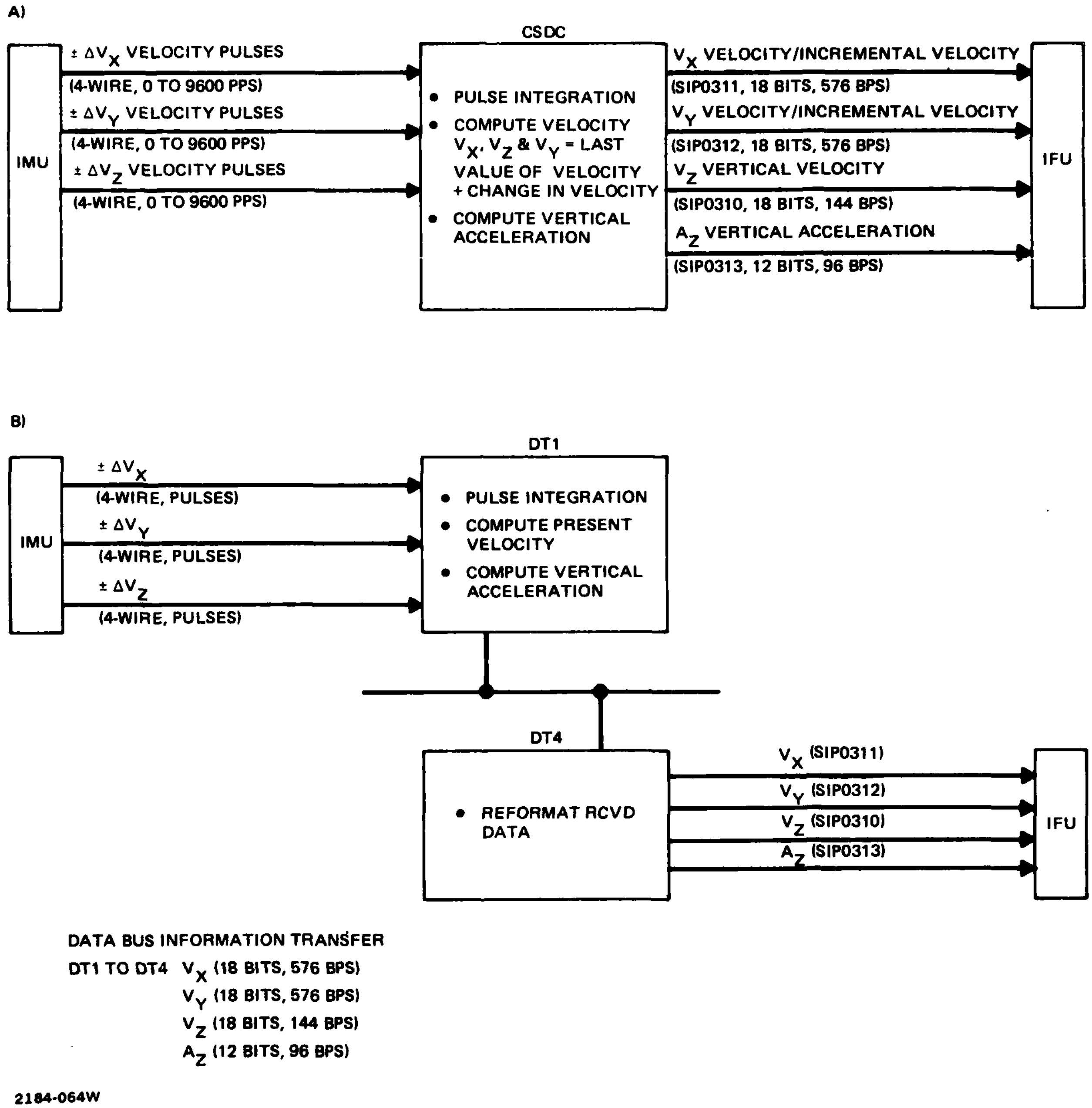
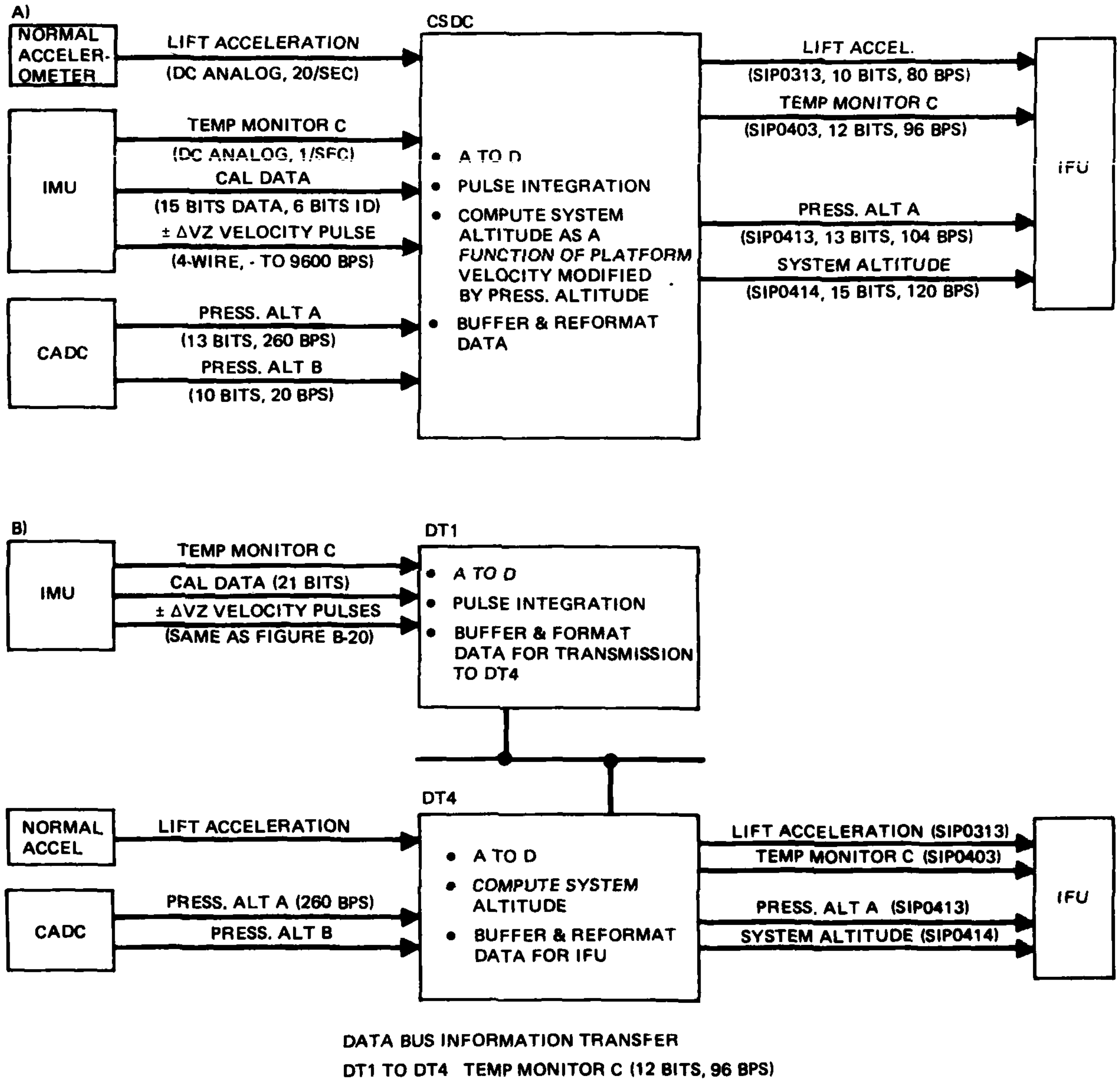


Figure 20 V_Z Vertical Velocity, V_X Velocity/Incremental Velocity and V_Y Velocity/Incremental Velocity



2184-065W

Figure 21 Lift Acceleration, System Altitude, Temp Monitor C, Pressure Altitude A

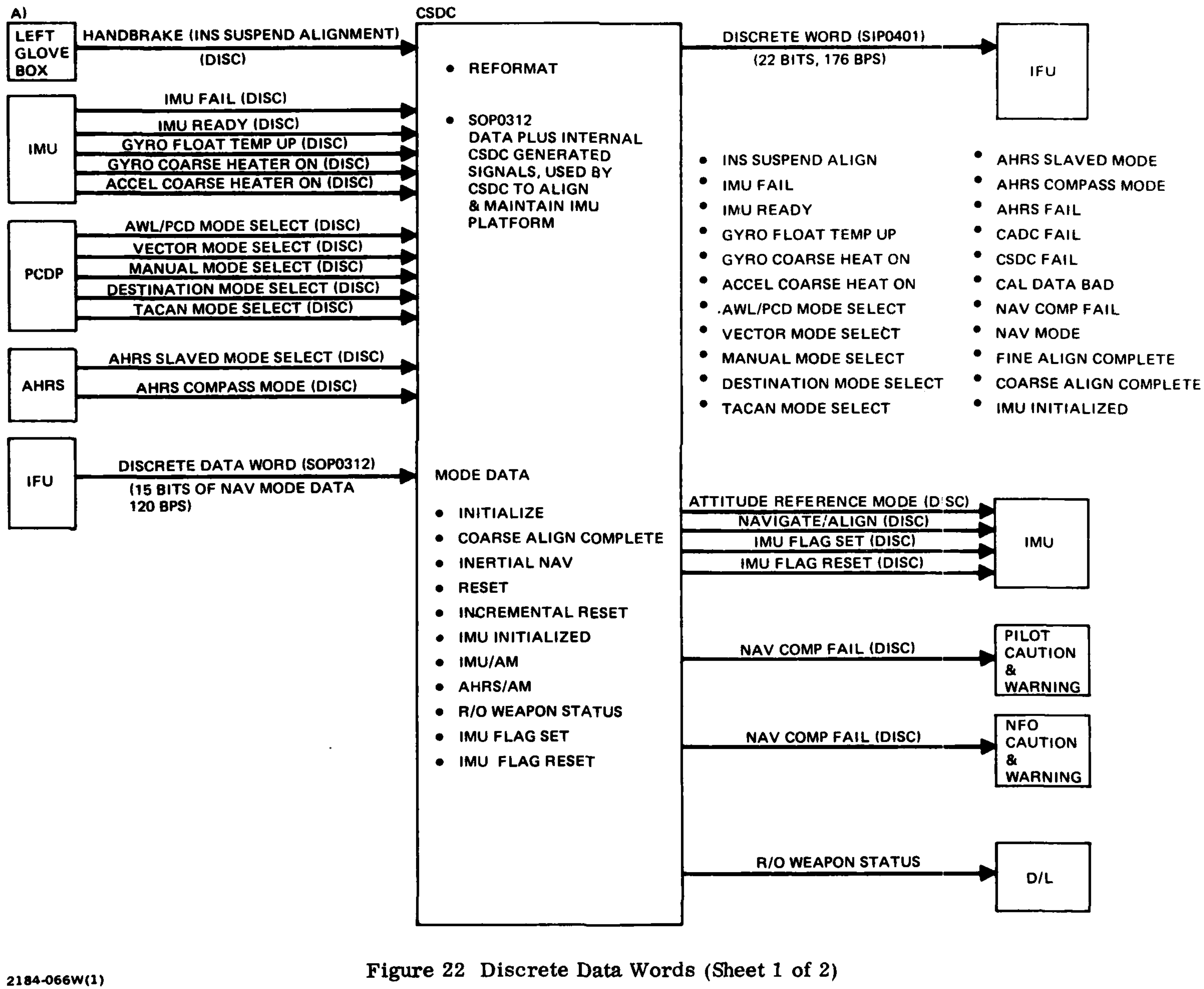
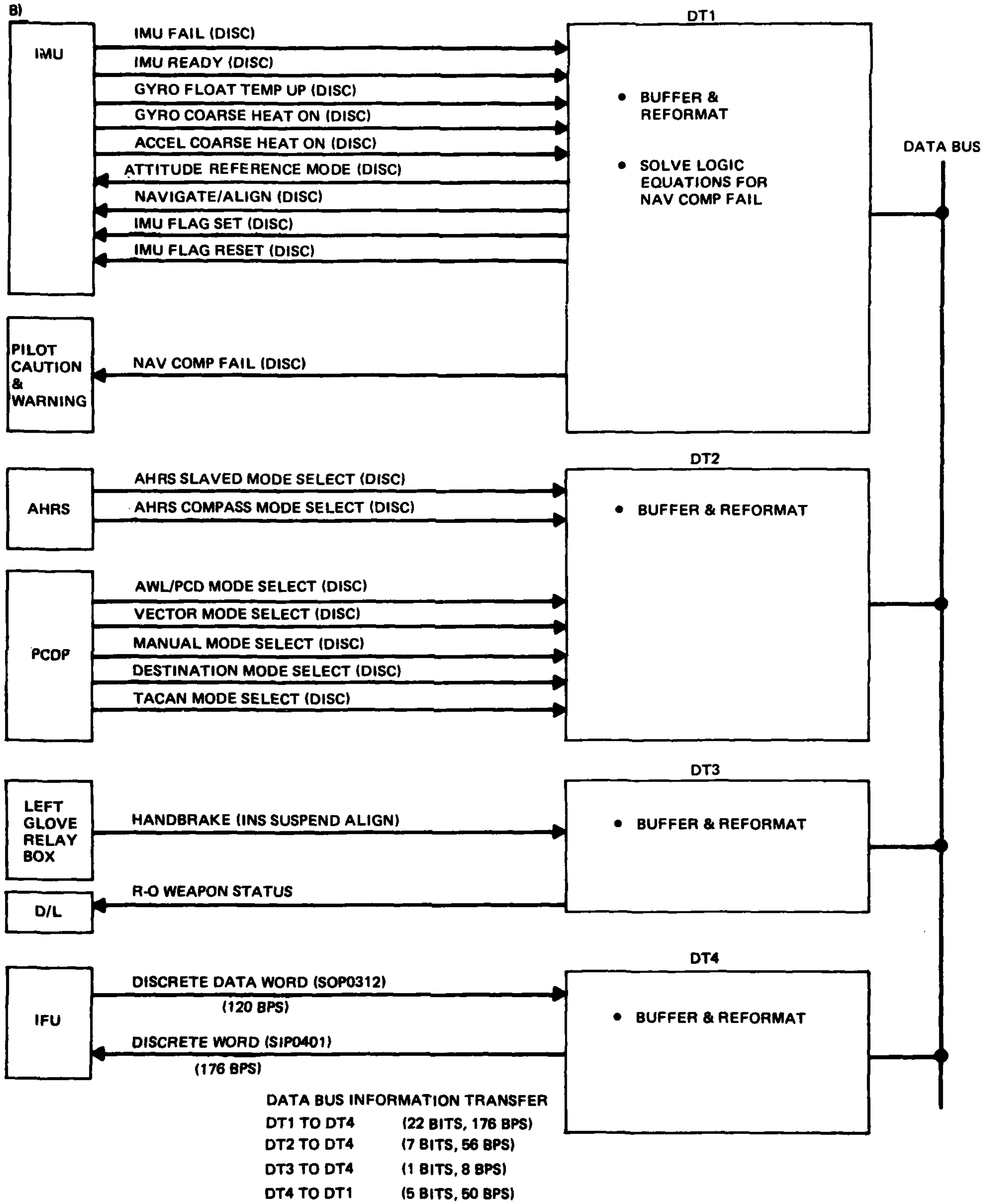
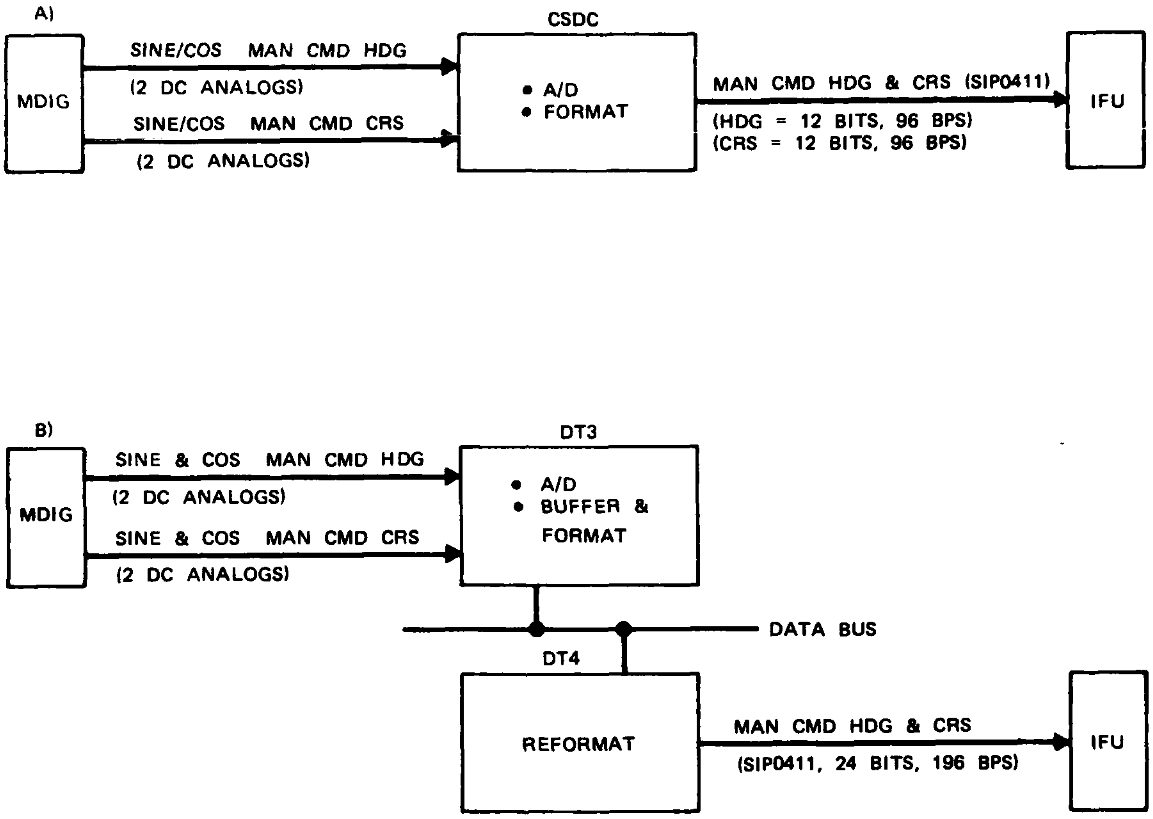


Figure 22 Discrete Data Words (Sheet 1 of 2)



2184-066W(2)

Figure 22 Discrete Data Words (Sheet 2 of 2)

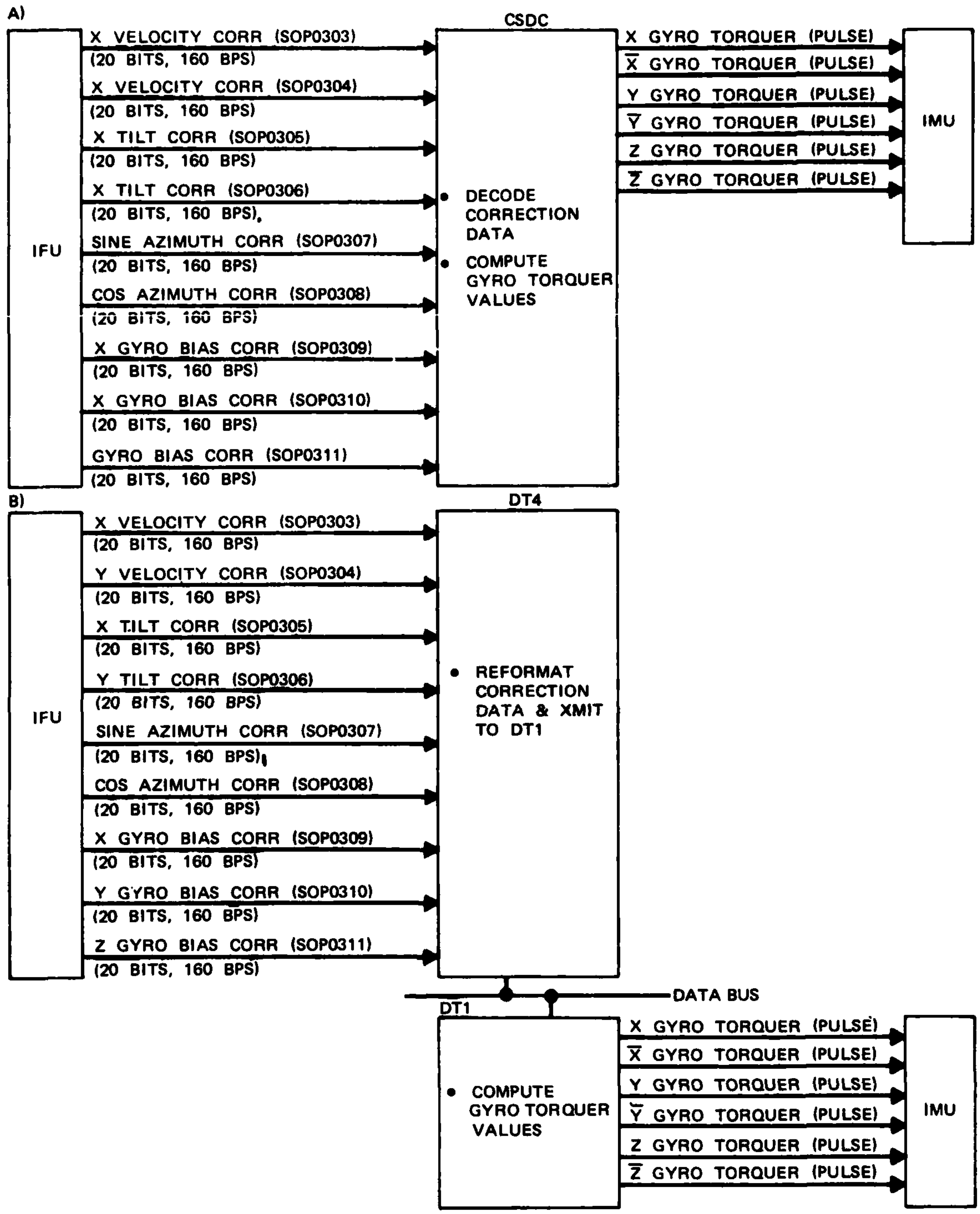


DATA BUS INFORMATION TRANSFER

DT3 TO DT4 - MAN CMD HDG (12 BITS, 96 BPS)
MAN CMD CRS (12 BITS, 96 BPS)

2184-067W

Figure 23 Manual Command Heading and Command Course

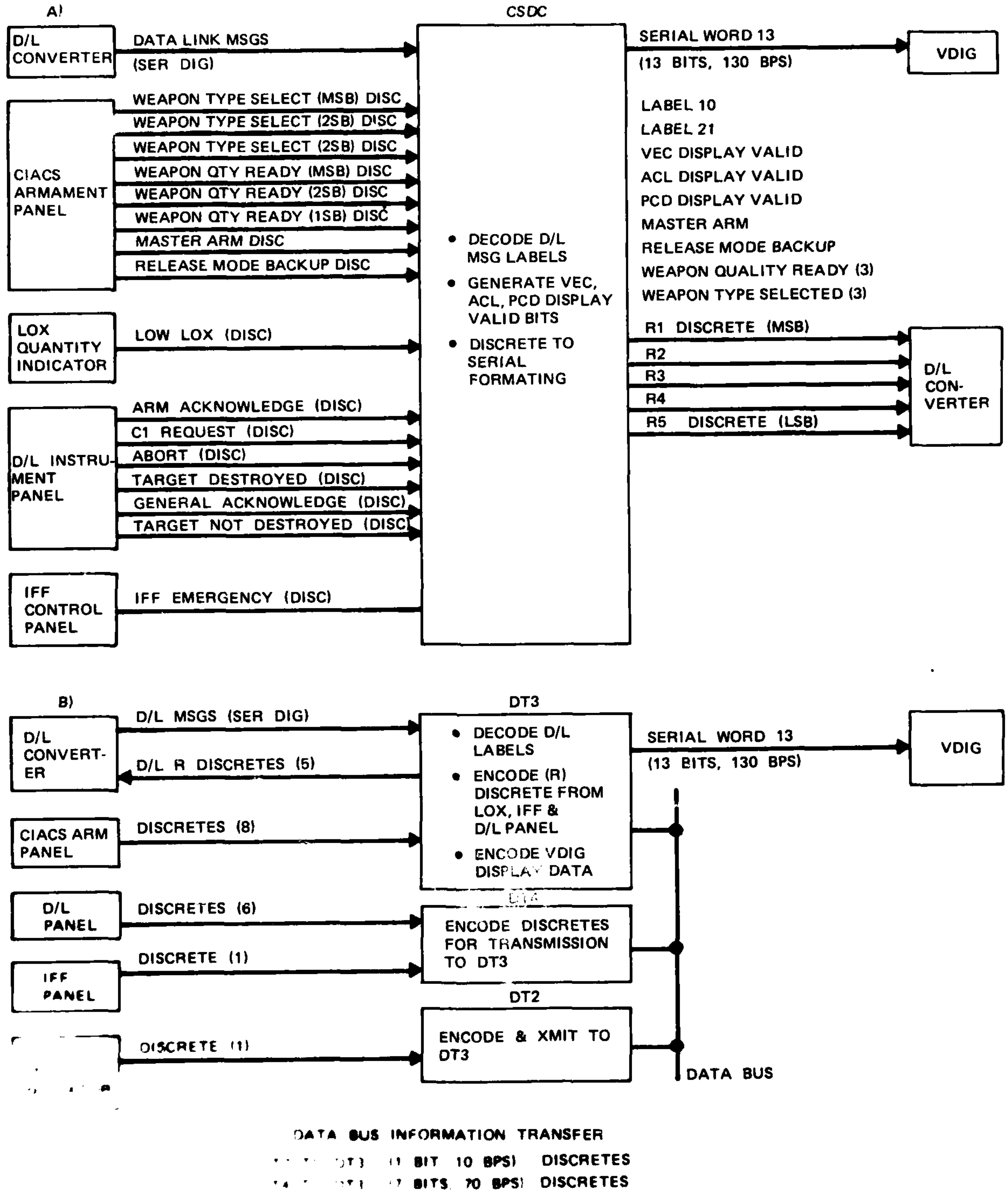


DATA BUS INFORMATION TRANSFER

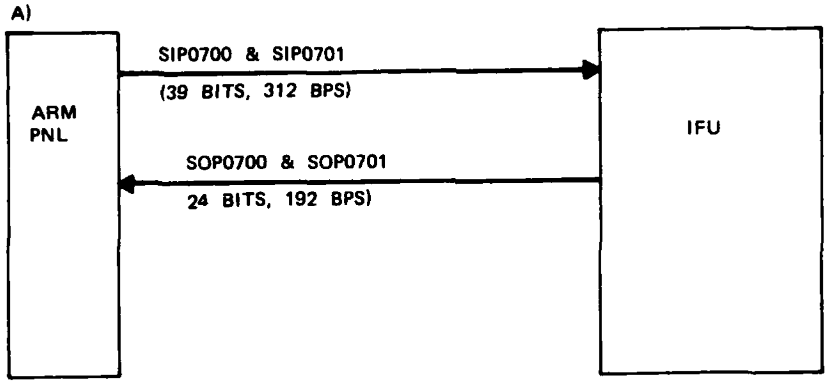
DT4 TO DT1 - SOP0303 TO SOP0311 (180 BITS, 1440 BPS)

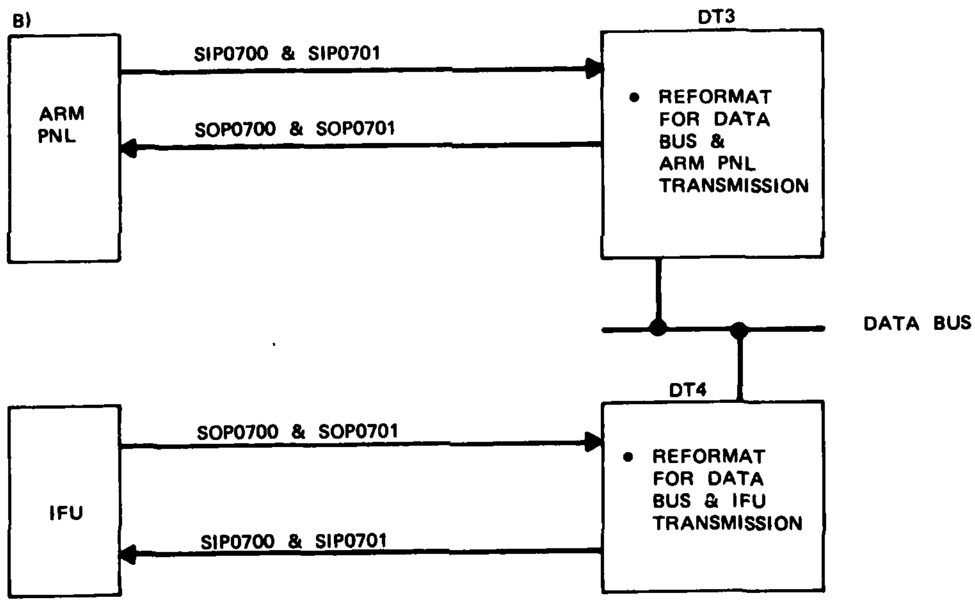
2184-068W

Figure 24 Gyro Torquing Pulses



[illegible] Word [illegible] and Discrete Interface





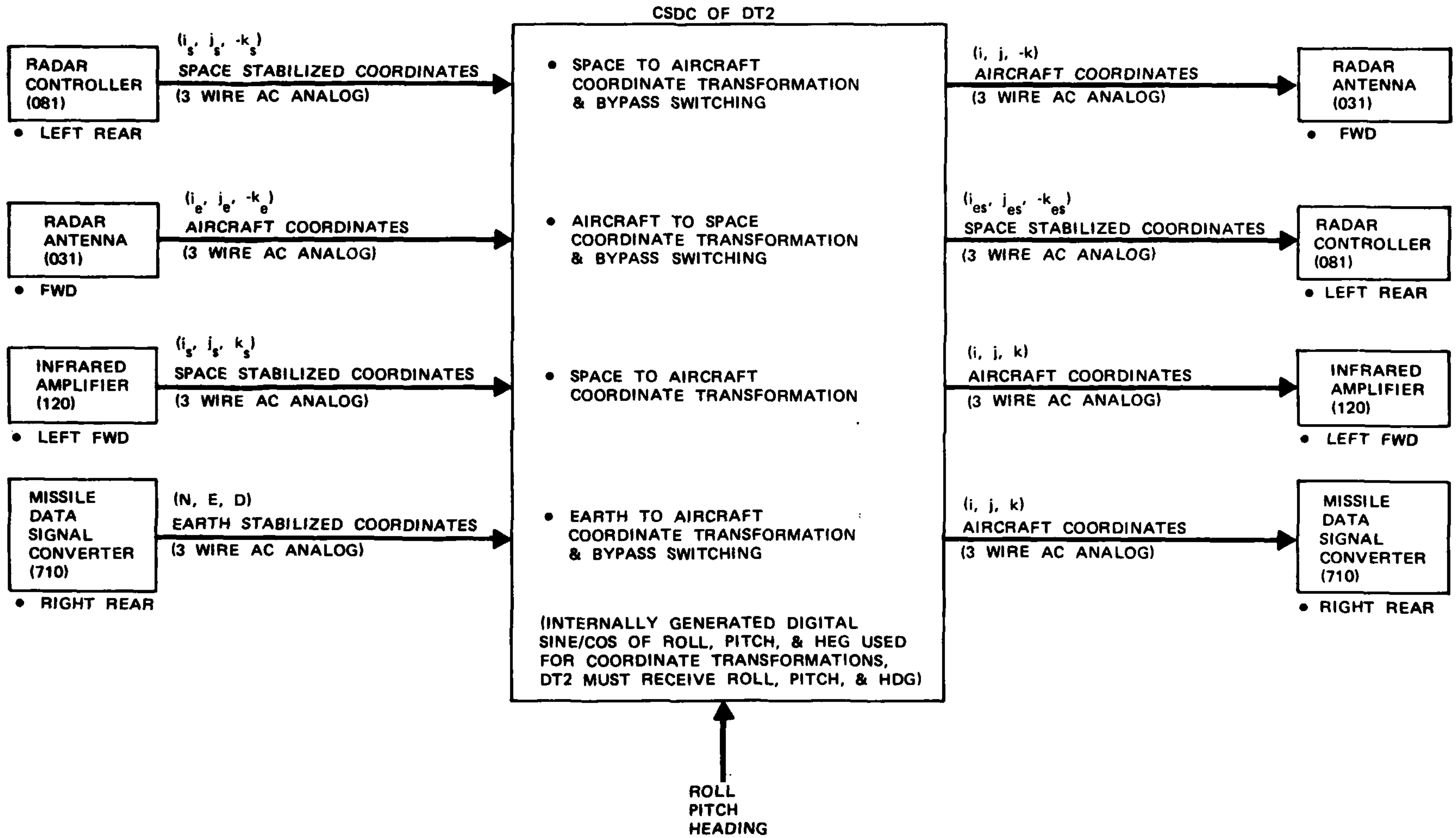
DATA BUS INFORMATION TRANSFER

DT3 TO DT4 - SIP0700 & SIP0701 (39 BITS, 312 BPS)

DT4 TO DT3 - SOP0700 & SOP0701 (24 BITS, 192 BPS)

2184-070W

Figure 26 SIP 07/SOP 07 CIACS (AWG 15)



2184-071W

Figure 27 Coordination Transformations

5916-71